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ott, C. W. Leng, Ignaz Matusch, C. E. Olsen, R. C. Osburn, C. H. Roberts, C. Schaeffer, C. E. Sleight, J. B. Smith, J. D. Sherman, Jr., and W. M. Wheeler. Most of these names will be found in the index of authors for the last three years. The JOURNAL has become in fact as well as in name the Journal of the New York Entomological Society.

The local collection is a recent feature of the society's activity and, under the management of Dr. Lutz and with the hearty coöperation of our members, reflects in a most gratifying way the strength of our society. The intention is that ultimately this collection shall contain many specimens of every species to be found within about fifty miles of Manhattan, accurately determined by specialists, all catalogued with complete data arranged in card form and accompanied by tables exhibiting the differences by which the species are separated. Thus far labels have been prepared for the species believed to occur within the boundaries selected, specimens have been inserted as far as available material permitted, and many of the groups have been carefully gone over by specialists. Much remains to be done and some time must elapse before the local collection attains its maximum usefulness. The donations to the local collection and the workers upon it have been so many that I hesitate to single out any for praise for fear of unintentionally doing injustice by omission.

The library of the society has been in charge of Mr. Schaeffer for the last nine years and its growth during that time has been entirely the result of his efforts. When he became librarian the books and pamphlets scarcely filled three shelves; now new book cases are continually required to hold the accumulating volumes. Nine years ago our JOURNAL was sent free to many societies and institutions; now under his management we receive in exchange the publications of nearly every important society and institution, and by free gift the entomological publications of the National Museum. We exchange with about thirty societies and institutions. By vote of the society the librarian is also authorized to acquire entomological works by purchase, and during the past year this authority has been used to buy Blatchley's Beetles of Indiana, and to subscribe to the new catalogue of the Beetles of the World. It is to be regretted that our members do not derive more benefit from the possession of these journals and books, and it may be possible for the executive commit-

tee and the librarian in consultation to devise a plan for making the library a more prominent feature of the society's activity.

The satisfactory progress of the society during recent years which I have endeavored to illustrate, has been due largely to the motherly care of the American Museum of Natural History, which has at different times allowed us to use various rooms in the museum as our meeting place and finally our present luxurious quarters where we have an abundance of room, light, warmth, current literature, use of library and collection, and last but not least, this famous table about which our entire membership can gather in dignity and comfort. Not only on meeting nights are these advantages open to us free of cost, but practically every day, Sundays and holidays included, whenever the museum is open to the public our members can consult the local collection, the library and the curator. We owe a lasting debt of gratitude to this museum and its trustees and officers, which I am happy to say has been recognized by our members in donations of specimens and other ways.

Thus far I have spoken of the past and present of our society and its journal. I wish now to refer briefly to the future. The society will always need new members and young members. Every year resignation and death remove men whose loss we keenly feel. 1910 was no exception to the rule, but unhappily witnessed the death of our honored friend Zabriskie. The society can only keep its present strength and gain more by the election of new members, and I hope that each one of us will bear this in mind and propose some young friend for membership during the year.

The local collection will for a long time, perhaps always, need donations of specimens and particularly of carefully labelled specimens. There has been great progress in this respect since the days when some of us were young, and a state label is no longer the satisfying adjunct to a specimen that it was in the days of Schaupp. The system now recommended by our curator is one by which the specimen in addition to its locality label bears a number which refers to a field card upon which complete ecological data can be entered. Copies of such cards can be had from the curator, and the free use of them by our members will preserve a fund of information and field experience which at present is largely lost.

The JOURNAL needs short paragraphs as well as important papers

and I do not believe I exaggerate in saying that each of us can contribute at least one during the year. Such paragraphs may refer to interesting captures, to life histories or habits, to variations, collecting places, to anything that in conversation we would think worth mentioning. The editor will find it easier to make up his pages, our subscribers will find the JOURNAL more interesting, and those who have not heretofore contributed will especially benefit themselves and others by making it a point to contribute at least one paragraph during 1911.

In closing there is one point that I wish especially to bring to your attention, which is the advantage of specializing in some one group in addition to the study of entomology in general. The number of insects in the world is so great that no one can expect to become expert in all. The number even in most of the families is appalling. It follows that the best taxonomic work is done by experts who confine their studies to some comparatively small group in which, however, they include the species of the whole world. And, in Coleoptera at least, it is to be regretted that at present such experts are almost invariably Europeans. Among the members of our society it is gratifying to note a tendency to depart from this situation. And I would urge upon our members the opportunities they enjoy for following up the suggestion I make and the advantage that would accrue to themselves and the society from its adoption. This museum contains much foreign material, the National Museum likewise and Mr. Hallinan's collection is rich in insects from Panama. Outside of the European species such material is largely unnamed, and I am sure the owners in every instance would welcome the assistance of specialists. It is not difficult to obtain such material from European dealers and if the group selected is small it is not especially expensive. The West Indies are easily and cheaply reached, and are rich in undescribed species. The field is open to each of us to select some small group and form a collection that will reflect credit upon its possessor and be of service to his friends while at the same time the reputation of our society and JOURNAL will become enhanced. Upon the younger members of the society especially I would urge that an entomological reputation can be honestly earned most rapidly by taking up some small family, accumulating the described species and literature, and proceeding at once to the description of the now unknown forms.

Dr. Leconte was only twenty when he published his first descriptions. The material is on hand in this building waiting for you to go to work and follow in his footsteps.

Gentlemen, I thank you for your attention, and congratulating you upon the healthy growth of the society and urging upon you the need of more copious field notes, of more paragraphs for the JOURNAL and of more specialists in the society, I wish you all good health, good luck and lots of good bugs for 1911.

NOTES ON COCCINELLIDÆ. IV.

BY CHARLES W. LENG,

WEST NEW BRIGHTON, NEW YORK.

VARIABLE MACULATION IN COCCINELLIDÆ.

The variable character of the maculation of the Coccinellidæ is not only shown by inspection of the insects themselves but is reflected in the numerous specific names indicating spots, stripes and bands that have been applied to them. In no other family do we find so many names like *unipunctata*, *bipunctata*, *tripunctata*, etc., which are repeated in the Coccinellidæ over and over again and might be arranged in a complete series to *28-punctata*, with no numbers missing except perhaps 17 and 23. Even combinations like *bistripustulata* have been formed to indicate the number of spots; and *fasciatus* and *cinctus* and *lineatus* in all manner of combinations to describe other styles of ornamentation.

The question arises in the study of these insects as to how much importance is to be attached to these differences in maculation. Does each pattern indicate a genus or a species, and each variation in the pattern a subspecies or variety requiring a name; or are the differences sometimes merely individual characteristics? Are some of the species capable of producing offspring decidedly different in maculation? Are such differences in maculation partly due to temperature and moisture or some other pupal environment?

In connection with these questions we may compare the method of treating similar differences in the European Coccinellidæ and two papers that have recently appeared in America, viz., "Notes on the

Coccinellidæ," by Thos. L. Casey (Can. Ent., XL, 1908) and "Determinate Evolution in the Color Pattern of the Lady Beetles," by R. H. Johnson (Carnegie Inst., June 29, 1910). The former European practice is shown in the "Bestimmungs-Tabellen der Europäischen Coleoptera, II, Coccinellidæ," 1879, by Julius Weise, in which every difference in maculation known to its author seems to have received at least a varietal name.* Under some species many varieties are cited, and since 1879 their number has been increased. The tables show no characters for their separation except maculation. This practice does not seem to meet with general approval and various articles showing the common parentage of the supposed varieties have been printed. Weise himself in a letter deprecates too great reliance on color characters and Casey says, "A large proportion of them are really synonyms."

Casey's paper is important on account of his voluntarily reducing a number of his previously described species to the rank of subspecies, in harmony with his criticism of the European method. Otherwise its attitude appears to be not very different from that of his former work on Coccinellidæ published in 1899, in which he did not hesitate to adopt "type of coloration as a primary taxonomic character" (Jour. N. Y. Ent. Soc., VII, p. 121).*

To the student of Orthoptera or Lepidoptera this may appear a safe course to pursue; but to one accustomed to the variable maculation of the Coccinellidæ it cannot be acceptable without an examination of the foundation on which the theory was built and the results which followed its use. The collection with which he worked would be the natural foundation and, by several statements, seems to have been too small to justify the generalization. *E. g.*, in speaking of *Hippodamia glacialis* he says (p. 79), "anterior spot always wanting," whereas in fact no very large series is needed to show that the spot is frequently present. Again (p. 106), speaking of *Axion*

* This theory in his own words is "Type of ornamentation has not been regarded as a generic character hitherto, but is in reality one of the most important, especially that of the pronotum" (JOUR. N. Y. ENT. SOC., VII, p. 82). Later in the same article the idea is presented a little more strongly, viz., "Ornamentation may become in other words as important a generic structural character as any other special modification" (p. 120), and on page 121, referring to *Hyperaspis*: "In adopting type of coloration as a primary taxonomic character, however, this is restricted below to the patterns of the elytra" (p. 121).

3-pustulatum, he says, "does not seem to be at all abundant, and my cabinet contains only the single specimen taken some twenty years ago." Mr. Davis has taught us that this species is abundant on oaks infested with Kermes. Instances might be multiplied by citing the species he has described from single specimens, but the above are sufficient to show the weakness of the collection with which he worked. As to the results he reached by using type of coloration as a primary taxonomic character, we may compare his statement (p. 109), "*ovoides* and *desertorum* of the table are in all probability subspecies of *californicus*," with this sentence printed nine years later: "Neither of these forms (*ovoides* and *desertorum*) has anything whatever to do with *californicus*, either in general appearance or other token of consanguinity." The first statement was possibly the result of studies based on type of coloration alone; the second followed the description in our JOURNAL of the structure of the claws.

Again, in the Canadian Entomologist article, p. 413. Casey has described *Brachyacantha metator* n. sp., using color and maculation as his guide. Later in Volume XLII, p. 109, he has transferred this species to *Hyperaspis*, because an examination of the structure of the tibiæ showed the absence of the tooth which is characteristic of the genus in which he originally placed it.

There is no intention in these remarks to belittle Major Casey's work, which indeed speaks for itself; but the intent is to show that his adoption of type of coloration as a primary taxonomic character was based upon the study of too few specimens to enable him to judge correctly the status of each specimen and led him into a number of confessed errors which, to a certain extent, must deprive his conclusions of the authority they would otherwise derive from his long experience in the study of Coleoptera.

Let us now compare the information contained in Johnson's work. This author was fortunate in finding a hibernating mass of 15,415 individuals of *Hippodamia convergens* at Marsh Hill, Fairfield, Wash., which being sorted was found to contain 6,954 normal specimens and 63 different varieties, some so close to normal *convergens* that they would have been accepted as such, others more aberrant and gradually leading to the varieties that had already been suppressed as synonyms and beyond them to varieties that had previously, in the light of the series ordinarily found in good collections,

seemed distinct. Johnson's figures on page 28 would seem sufficient finally to prove the relationship of these supposed varieties of *convergens*, for scarcely a conceivable intergrade is missing. In connection with the large number of specimens he found, it is worth while to mention that F. W. Nunemacher found a cliff 300 feet long at Cactus Springs, Nevada, covered with *Hippodamia convergens*. He says the whole country was red with the congregated insects (Ent. News, November, 1910). The study of these captures, perhaps, was the foundation for the statement of Carl Fuchs at a meeting of the Pacific Coast Entomological Society that the number of spots he had observed in *Hippodamia convergens* ranged from none to twenty-two, with other variations (Ent. News, November, 1910, p. 432).

To return to Mr. Johnson's discoveries, he found also a mass of *Hippodamia spuria* in which, out of 759 individuals, only 256 were normal. On page 47 he figures the abnormal specimens which, as in the case of *convergens*, include patterns previously regarded as distinct and the intergrades leading to them. The ideas which these finds engendered were corroborated by a series of *Coccinella subversa* in my collection obtained by Miss Florence Dennis at Dilley, Oregon, of which many specimens are illustrated on page 59, and by many similar though smaller series in the various collections Mr. Johnson examined, and led him to attempt by artificial breeding to show that the variation he had observed was determinate, *i. e.*, a progressive variation in some definite direction. While his experiments in this direction do not seem to have been sufficiently continued to prove the case as completely as the corresponding experiments of Tower with *Leptinotarsus*, they throw a great light on the variable maculation of Coccinellidæ. He found, for example, that "an increase of pigment was obtained by exposing the prepupa and pupa to the cold of a refrigerator (5° to 15° C.), a cellar (15° to 17° C.) and the intermittent temperature of a room where the temperature dropped during the winter months to 5° C. at night." At the same time he observes that "subspecies of the mountains and high latitudes" show "a larger percentage of the absence of pronotal dash," and by inference from other passages he might have added that such subspecies (as he calls them) always have more black markings. He found that breeding from an abnormal female of *Coccinella 9-notata* resulted in a progeny in which the peculiarities

of the mother were not only reproduced in part of the offspring, but greatly exaggerated in some. His figures on page 61 of these descendants of *C. 9-notata* seem to be sufficient to account for any extraordinary unique occurring in nature.

Other observations which are instructive are those on the inconstancy of the sculpture and shape of the elytra which have been relied upon by some authors to support differences in maculation. Many other interesting sentences might be quoted, but perhaps the strongest one of all for our present purpose is the brief summary on page 81 of all Johnson's observations and experiments—"*diversity prevails.*"

Thus we have seen that while the European practice has been to apply names freely to the variably maculate Coccinellidæ, and to some extent the same practice has been followed by Casey on the ground that type of coloration may be adopted as a primary taxonomic character, yet an examination of very large series in three species discloses an extraordinary amount of individual variation and Johnson's experiments in breeding show even greater possibilities in the same direction and justify a conclusion that such variations in maculation are more often individual than racial.

With the proviso that the conclusion is restricted to Coccinellidæ and does not by any means include such beetles as Cicindelidæ, which are more subject to the influence of isolation, it may be regarded as proved by Johnson's observations and experiments, as well as by other evidence, that there is a strong tendency to a variability in maculation in Coccinellidæ which is purely individual, as shown in the various series quoted; that the effect of the cold of high latitudes and elevation is always to produce more black coloring; and that therefore specific names based on maculation alone cannot properly be applied to such variations in Coccinellidæ and such as have already been applied can at best be regarded as varietal names.

A NEW SPECIES OF DINEUTES.

BY CHARLES W. LENG,

WEST NEW BRIGHTON, NEW YORK.

Dineutes robertsi, new species.

Very large, entirely bronzed above, testaceous beneath. Regularly oval, feebly convex; upper surface entirely bronzed, very shining, very minutely punctulate, with larger shallow punctures intermingled, which become more abundant towards apex of elytra; striæ of elytra very faint even at sides; lateral margins of elytra not sinuate, depressions feeble, sutural angles broadly rounded in both sexes; under surface, including legs, entirely pale testaceous; anterior tibiæ sinuate, apex truncate; femur without tooth, its upper surface with punctures (six ♀, eight ♂), from which proceed stout hairs. A row of stouter hairs proceed also from groove of femur. Length, 13 to 16 mm.

West Branch War Woman Creek, Rabun Co., Ga., in the mountains, at an elevation of about 2,000 feet.

This species closely resembles *vittatus* in form and structure, but is a little larger and therefore the largest species we have. It differs especially in color, being entirely bronzed above instead of vittate as in *vittatus*, and entirely pale testaceous beneath instead of dark brown with middle and posterior tibiæ pale as in *vittatus*. The punctuation is also different and the elytral striæ are not more evident at sides.

This species was first observed by Mr. Davis and myself in June, 1909, at a ford where the road from Clayton, Ga., to Bleckley's Store crosses the west branch of War Woman Creek. A few specimens were taken at that time, and in July, 1910, Mr. Davis obtained a good series by wading some distance up the stream in which unfortunately no very large schools were seen. Later what appeared to be the same species was seen in Tuckaluge Creek, near by, but none was captured. It is, however, probable that this species occurs elsewhere in the mountains.

I take great pleasure in dedicating this fine species to the friend of many years, Mr. Chris. H. Roberts, whose paper, "On the Species of *Dineutes*," has made their determination possible and certain.

DESCRIPTIONS OF THREE NEW NORTH AMERICAN
SPECIES OF THE MYMARID GENUS POLYNEMA
HALIDAY PARASITIC ON MEMBRACID EGGS,
WITH A LIST OF THE SPECIES DESCRIBED
SINCE THE YEAR 1898.

BY A. A. GIRAULT,
URBANA, ILLINOIS.

The following isolated descriptions are published in order to enable the names of the species to be used in forthcoming entomological publications and also to establish a species whose status has been that of a *nomen nudum*.

1. *Polynema striaticorne*, new species.

Normal position.

Female.—Length, 1.64 mm.; comparatively robust and large. Normal in size for the genus; easily visible to the unaided eye.

General color reddish brown to blackish, including the coxæ, femora and tibiæ; scape, pedicel, three proximal tarsal joints, base and apex of the tibiæ, base of the femora and the trochanters honey yellow and also the abdominal petiole; first funicle joint with some yellowish; distal six joints of the antennæ and distal tarsal joint dusky black; venation yellowish brown, the marginal vein longer than wide but normal for the genus, darker. Wings hyaline. Color variable.

Fore wings moderately densely ciliate in the disk, the discal cilia moderately fine and strong, about twenty longitudinal lines across the widest portion of the wing; the marginal cilia beyond the distal half of the wing long, about five eighths the length of the greatest width of the wing, the apex of the wing regularly rounded, its greatest width at about the distal fourth; long, graceful. Marginal cilia of the posterior wing (caudal margin) more than twice longer than the wing is wide, at least twice the size of the cilia of the cephalic margin, the disk of the wing with no cilia excepting along each margin: along the cephalic margin, excluding the marginal cilia, there is a double or paired line running the length of the distal two thirds of the wing, along with the marginal cilia, but gradually disappearing proximad, beyond the marginal cilia and before attaining the venation; along the caudal margin the outer (caudal) line does not appear until the distal third of the wing is reached and proximad the other line begins to disappear sooner than the marginal cilia. Abdomen conic-ovate to conical, about equal to the combined length of the head and thorax or somewhat longer, the ovipositor barely exerted. Marginal vein with two distinct notches in its cephalic margin.

Vertex delicately reticulated, face nearly polished. Scutellum with the

usual curved, transverse line of foveæ at distal two thirds and at its base a transverse line of slightly elongated foveæ along the division between the scutum and the scutellum. Mesoscutum and scutellum with barely perceptible sculpture but present as fine polygonal figurations.

Antennæ 9-jointed, apparently naked but under high power (one sixth inch objective) a few scattered setæ are present; hispid as in *maculipes* Ashmead when unmounted. The scape is ovate, widest at distal third, slightly longer than the pedicel and first funicle joint combined but not more than three fourths the length of the abdominal petiole, slightly longer than joint 3 of the funicle; pedicel shorter, slightly more robust, subpyriform, a third longer than the following joint; the latter (joint 1 of funicle) distinctly the shortest antennal joint, cylindrical, a third the length of funicle joint 2 or 3; joints 2 and 3 of the funicle subequal, distinctly the longest funicle joints, joint 2 slightly longer than 3, both cylindrical and subequal in length to the scape but much slenderer and distinctly shorter than the club and but a fourth as wide; funicle joint 4 shortened and very slightly thickened, but two thirds the length of joint 3 and slightly shorter than joint 5; the latter more thickened, slightly longer, rectangular, subequal in length to joint 6 of the funicle and about a third wider than joint 3 or 4; the distal or sixth funicle joint is no longer but wider, elliptical-ovate, not quite half as wide as the greatest width of the club but of nearly the same shape, not quite as wide as the scape; club forming an enlarged ovate mass which is slightly longer than the combined lengths of funicle joints 5 and 6, distinctly the largest antennal joint; undivided; along its sides and extending from the apex proximad are a few short, longitudinal grooves, very conspicuous in the shape of striæ on all male antennal joints excepting the scape and funicle.

Proximal joint of the tarsi of the caudal legs long and slender, subequal to the combined lengths of the three distal joints, which are all subequal, the third joint somewhat shorter than the second, the second joint somewhat the longest of the three.

(From 12 specimens, two thirds inch objective, one inch optic, Bausch and Lomb.)

Male.—Length, 0.982 mm.

The same but more graceful, somewhat darker; third tarsal joints with some dusky; scape concolorous with the funicle, dusky black, the pedicel alone being honey yellow; first and second joints of the caudal tarsi somewhat longer in relation to the others; proximal joint of the cephalic tarsi at base ventrad with a few stiff bristles forming the strigil with the curved and forked cephalic tibial spur.

Abdomen (lateral aspect) hemispherical to ovate, flat ventrad, convex dorsad, no longer than the thorax.

Antennæ 13-jointed, the funicle filiform and loosely jointed, all of its joints distinctly longer than wide, cylindrical and subequal, very gradually shortening distad, joints 2, 3, 4, 5, 6, 7 and 8 about equal and longest, the proximal joint and joint 9 slightly shorter; joints 10 and 11 of the funicle each slightly shorter than the one preceding, joint 11 or the club shortest of the funicle

joints, about a fourth shorter than any of the joints from 2 to 8. Pubescence or clothing inconspicuous; funicle joints distinctly, uniformly longitudinally ribbed or striate and the disto-lateral angle of each is subacute, the distal ends truncate, the proximal ends slightly narrowed and then truncate. Pedicel gourd-shaped, truncate distad, then convexly swollen, then proximad, ending in a neck; pedicel slightly more than half the length of the first funicle joint; scape short, not very much longer than the pedicel and dilated ventrad to the width of the pedicel. Antennae longer than the body.

(From 6 specimens, two thirds inch objective, one inch optic, Bausch and Lomb.)

A large and graceful species with long wings and closely resembling in some respects *Polynema howardii* (Ashmead), but the fore wings are somewhat more finely ciliated (about 20 lines of cilia instead of about 18); they are somewhat broader, especially as noted in regard to their proportionate length to the longest marginal cilia, their caudal margins are convex instead of nearly straight and the antennal joints of the male are distinctly longer and more slender (the female of *howardii* is unknown). The species is so different from *maculipes* Ashmead, also of which the male only is known, that particular differences will not be mentioned here other than to state that the fore wings are very much larger and more densely ciliated, the discal ciliation of the fore wings in *maculipes* being very coarse, the wings themselves narrow.

Described from the following series of specimens:

I. Two balsam slides from Dr. E. P. Felt, State Entomologist, Albany, N. Y., through Mr. C. T. Brues under date of March 3, 1909, thus—a male specimen on one slide labelled “a 1695, Aug. 31, 1907, Albany, N. Y.”; and a female specimen on the other slide labelled “a 1101 xx. Alb. May 12, 1906.” Under date of October 11, 1910, Dr. Felt stated in a letter concerning these specimens—“a 1695 was obtained from clover heads infested with the clover midge, *Dasyncura leguminicola* Lintn., taken in the vicinity of Albany, N. Y. The female mounted on the slide labelled a 1101 was undoubtedly reared from a jar containing galls of *Rhabdophaga triticoideus* Walsh on *Salix cordifolia* taken in the vicinity of Albany, N. Y.” Accordingly, the host relations here are obscure.

II. A collection of 3 males and 10 females on tags received from Mr. H. E. Hodgkiss, N. Y. Agricultural Experiment Station, Geneva, N. Y., through the National Bureau of Entomology and all labelled

"Membracid eggs. Apr. 30, 1908. Coll. N. Y. Exper. Sta." Also four slides from the same source bearing 2 males and 2 females labelled "N. Y. Agr. Exp. Sta. Parasite on pear membracid, *C. taurina* Fitch" and respectively "4/26/05. Geneva, N. Y. On eggs," the 2 males, and "4/26/05", "5/11/05. Kept 2 wks.", the females.

III. Two tag-mounted specimens, male and female, in the United States National Museum collection, labelled "Par. on eggs *Ceresa bubalus*. 4/20, '93. From Miss Murtfeldt," and in Ashmead's handwriting "*Cosmocoma maculipes* Ashmead." Also in the same collection another male specimen bearing the label "1129 P°. On *Ceresa*. Issued May 5, '92."

IV. A single male mounted in balsam, captured in a greenhouse, Urbana, Illinois, October 8, 1910.

Parasitic therefore on the eggs of *Ceresa bubalus* Fabricius and *Ceresa taurina* Fitch.

Habitat.—United States—New York (Albany, Geneva); Missouri (various localities); Illinois (Urbana).

In the literature this species is the *Cosmocoma* referred to by Marlatt* which destroyed the eggs received by Miss Murtfeldt from various localities in Missouri; also Riley† refers to the same species as a parasite of the *Ceresa*, but without giving other data.

Types.—Type No. 13,451, United State National Museum, Washington, D. C., 1 ♂, 1 ♀, in balsam, 2 slides (the 2 specimens of series I in preceding, N. Y.).

Cotypes.—Accession No. 44,176, Illinois State Laboratory of Natural History, Urbana, Illinois, 1 slide bearing 1 ♂, 1 ♀, in xylol-balsam (2 of the specimens of series II in preceding).

2. *Polynema enchenopæ*, new species.

Normal position.

Female.—Length, 1 mm.; smaller than the preceding, moderate in size for the genus.

Similar in general to the preceding but differing notably in the relative length of the third to the second funicle joint, here the former distinctly shorter, and in the coarser discal ciliation of the fore wings and the lesser width of the latter. More closely allied with *maculipes* Ashmead.

* Insect Life, U. S. Department of Agriculture, Washington, D. C., VII (1894-1895), 1895, pp. 12-13.

† Report Ent. in Report Secy. Agric. 1893, U. S. Department of Agriculture, Washington, D. C., 1894, p. 215.

General color variable, dilute brownish black; scape, pedicel, caudal coxæ, trochanters, three proximal tarsal joints and the cephalic tibiæ pallid yellowish; flagellum of the antennæ, cephalic and intermediate coxæ, femora, intermediate and caudal tibiæ and the venation dusky black, the club joint darker. Wings hyaline, excepting the slightly clouded middle portion of the posterior wings. Abdominal petiole yellowish brown to yellow. Eyes reddish, ocelli pink. Gular surfaces yellow. Abdomen reddish brown, smooth, shining, impunctate.

Fore wings in general as in the preceding species but decidedly more slender and the discal cilia are distinctly stronger and coarser, coarse, less dense, being about half as many in a transverse row across the widest part of the wing (about 11 to 12 longitudinal lines, counted from one margin to the other); posterior wings, however, as in the preceding species but the two lines of discal cilia near the margins are less distinctly paired.

Abdomen conic-ovate, longer than the combined length of the head and thorax, the hypopygium extending somewhat beyond the apex but the ovipositor not at all exerted. Legs as in the preceding species. Tibial spurs all single, the intermediate ones smallest, the cephalic ones long, comparatively stout and forked at its tip, forming a strigil with the longitudinal row of brush-like bristles along the ventral aspect of the proximal joint of the cephalic tarsi. Ventrad of the antennal bulbs, the face bears sparse hispid pubescence, the antennal bulbs widely separated, thrice the distance from each other than each is from the respective eye margin. Head (cephalic aspect) triangular, the face concave, margined laterad but the cheeks rounded. Eyes ovate. Parapsidal furrows distinct, complete, short, curved. Vertex broad but declivous cephalad of the cephalic ocellus, just caudad of that ocellus, acute transversely; ocelli in an obtuse angled triangle on the caudal half of the vertex, the lateral ones near the occipital margin, not near the eye margins, but nearly thrice farther separated from each other than each is separated from the eye margin and nearly twice the distance apart than each is from the cephalic ocellus, the latter about in the center of the vertex. Lateral margin of the eye slightly concave. The "vertexal carina" present (cephalic aspect), apparently a transverse grooved line along the cephalic margin of the vertex, abruptly changing angle laterad and proceeding obliquely caudo-laterad along the eye margin and then (dorsal aspect) at the caudo-mesal angle of the eye, changing angle, proceeding obliquely caudo-mesad to the occipital margin where it is lost (caudal aspect), apparently, however, in the foraminal depression curving convexly, caudo-ventrad or beyond the occipital margin, curving around to join the corresponding part on the opposite side and thus forming one continuous groove. This groove separates the lateral ocelli from the eye margins. (Dorsal aspect), occipital and cephalic margins of the vertex concave, the head longer (axially or cephalo-caudad) at the lateral margin by about a fourth, than at the meson, wide behind the eyes, the face scooped out between the eyes. Body very faintly sculptured, practically smooth. Scutellum hemispherical, smooth, at its caudal (apical, distal) fifth, following the apical margin of the sclerite is a convexly curved line of uniformly round dot-like punctures or foveæ. Metathoracic spiracles minute, circular, margined, no sulcus; metathorax polished, with no carinæ. Legs hairy, especially the tibiæ.

Abdomen smooth, dorsad the caudal margins of the segments straight, segment 2 largest along the meson, twice the length of segment 3, segments 3 and 5 subequal, 3 widest, segments 4 and 6 subequal, slightly shorter; 7 distinctly longer, frustum-like, segment 8 small, conic. Pronotum narrowed at the meson and grooved there, the mesoscutum acutely produced at the meson. Apical margin of the clypeus concave.

Antennæ inserted slightly above the middle of the face but not half-way up the eye margins, yet distinctly dorsad of an imaginary line drawn between the ventral ends of the eyes. They have the same general shape as in the preceding species, the principal difference being in the shorter third funicle joint which is not long and subequal to the second joint of the funicle but only two thirds the latter's length; the scape also differs in being dilated ventrad and of shorter length, its dorsal margin flat or straight, slightly longer than joint 2 of the funicle and distinctly longer than the pedicel and joint 1 of the funicle combined; pedicel subglobose, with a slight neck proximad, not quite as wide as the greatest width of the scape but at least thrice wider than the proximal funicle joint and a fourth longer; the funicle cylindrical, enlarging slightly distad, the six joints all longer than wide and unequal, joint 1 cylindrical, slightly widened distad, shortest, slightly over a third of the length of joint 2; joints 1-3 filiform, equal in width; joint 2 longest, slender, subequal to the scape and three fourths the length of the club joint; joints 3-6 subequal in length, after 3 gradually enlarging; of the four joints 3 and 6 are about equal in length, slightly longer than either 4 or 5, joint 6 distinctly thicker than the others but not abruptly so, ovate, distinctly less than half the length of the large club joint and about a third of its width; joints 4 and 5 distinctly wider than joints 1-3. Club undivided, the largest antennal joint, ovate, equal in length to the three distal (4, 5, 6) funicle joints but not half as long by far as the funicle taken as a whole; with some longitudinal grooves or striæ near apex. Antennæ more hairy than in the preceding species but not noticeably so, the clothing pilose and moderately loose, moderately close on the club.

(From 10 specimens, two thirds inch objective, one inch optic, Bausch and Lomb.)

Male.—Length, 1 mm., more or less, slightly shorter than the female.

The same, more graceful; two proximal joints of the antennal funicle with some yellowish. (Lateral aspect), abdomen ovate, the body of it about equal to the thorax in length, its petiole longer than the proximal funicle joint.

Antennæ somewhat similar to those of this sex in *striaticorne* but the joints are relatively shorter, less distinctly striated longitudinally, though traces of such sculpture are perceptible; the funicle joints are all cylindrical, much longer than wide and subequal in length and sparsely hispid. Funicle joints 4 to 10, inclusive, about equal, the distal or eleventh joint (club) about a fourth shorter, the proximal three joints of the funicle slightly longer, a third longer than the distal joints; scape short, compressed, dilated ventrad, distinctly longer than the pedicel and somewhat shorter than the proximal

funicle joint; pedicel subglobose, (lateral aspect) dilated ventrad, slightly convex dorsad, compressed, with a short, slightly curved proximal neck, slightly more than a half the length of the proximal funicle joint but much wider, its greatest width about equal to that of the scape (dorso-ventrad).

(From 7 specimens, two thirds inch objective, one inch optic, Bausch and Lomb.)

Described from 7 males and 10 females reared from the egg-masses of the membracid *Euchcnopa binotata* (Say) at Chicago, Illinois, September 15, 1908 (J. J. Davis). The eggs of the host were on *Ptelea*.

More closely related than the preceding to *maculipes* Ashmead and *howardii* Ashmead, differing from the former (male type) in having relatively finer discal ciliation of the fore wings (about 12 lines, *maculipes* but 10), in the broader fore wings, in *maculipes* the longest marginal cilia of those wings being seven eighths the greatest wing width, but in this species only about three fourths and in the general coloration of the legs. From the species *howardii* Ashmead in having distinctly coarser discal ciliation of the fore wings and in different wing shape; also in different coloration of the antennæ. A moderate sized species.

Habitat.—United States—Illinois (Chicago).

Types.—Type No. 13,452, United States National Museum, Washington, D. C., 2 ♂'s, 2 ♀'s in xylol-balsam (1 slide; part of cotype).

Cotype.—Accession No. 40,029, Illinois State Laboratory of Natural History, Urbana, 1 slide, 2 ♂'s, 3 ♀'s in xylol-balsam.

As stated, the foregoing two species are related to *maculipes* Ashmead and *howardii* Ashmead, whose identities are considerably mixed in the Ashmead determinations (in the U. S. N. M. collection for instance); from all others of this country and of those described since de Dalla Torre's catalogue, easily distinguished. From *picripes* Girault by the longer distal funicle joints of the female antennæ and the wider fore wings; *reduvioli* Perkins by the short proximal funicle joints; *hawaiiense* Ashmead by the shorter antennal joints; *needhami* Ashmead, *brasilense* Ashmead, *grenadense* Ashmead, and *albicoxa* Ashmead by the lack of an exerted ovipositor; *magniceps* Ashmead by thoracic characters and from *bergi* Ashmead and *rufescens* Ashmead by having hyaline wings and in being black in color, respectively.

3. *Polynema citripes* Ashmead, mss.*

Polynema citripes Ashmead—Webster, 1903, p. 33.†

Polynema citripes Ashmead—Girault, 1907, pp. 28, 32.‡

Polynema citripes Ashmead—Girault, 1907, p. 106.§

This species has never been described but as may be inferred has been mentioned several times in the literature of economic entomology. I describe it so that the name will not be lost.

Normal position.

Female.—Length, 0.75 mm.; small for the genus but visible to naked eye.

General color dusky black, the whole of the legs excepting the distal tarsal joints and the antennae excepting the enlarged club|| pallid to lemon yellow; distal tarsal joints and antennal club concolorous with the general body color; distal three funicle joints and the cephalic coxae with some tinges of dusky on one aspect; venation pallid to dusky; wings wholly hyaline. Eyes dark. Abdominal petiole concolorous with the legs.

Fore wings narrow and graceful, their proximal half slender, the blade not enlarging until the end of that half is reached when it gradually enlarges to the shape of a slender paddle, the longest marginal fringes distinctly longer than the greatest wing width, at least by a fourth, long and slender, the wing blade obtusely pointed, the apex dome-shaped, the wing from 7 to 8 times longer than broad, with moderately dense, moderately fine discal ciliation (about 9 lines but varying occasionally to only 5), which disappears proximad some distance out from the marginal vein; marginal fringes comparatively long, marginal vein bearing 2 setae from its surface, normal. Posterior wings narrow, straight, slender, linear, the marginal fringes of the posterior margin long and slender, the longest of them 5 or 6 times longer than the wing is wide but by far not half so long as the longest fringes of the fore wing, those of the cephalic margin moderately short, delicate, inconspicuous, slightly longer than the wing is wide. Discal ciliation of the posterior wing sparse, apparently irregular, apparently a single line of long, slender setae, far apart and alternating from one margin to the other but actually consisting of a single line of long cilia along each margin; posterior wings with a dusky appearance but really clear.

Tarsi 4-jointed, the proximal joint of the posterior tarsi longest but somewhat shorter than the combined lengths of the distal three joints, more than twice the length of the second joint, the other three joints subequal; the proximal joints of the intermediate and cephalic tarsi shorter in relation to

* As I shall show elsewhere, this species is the *Ooctonus longipes* of Ashmead, Canadian Ent., XIX, 1887, p. 192. Thus, the name will have to be *Polynema longipes* (Ashmead).

† Bull. No. 42, Division Ent., U. S. Dept. Agric., Washington, D. C.

‡ Psyche, Boston, Mass., XIV.

§ *Ib.*, XVI.

|| The whole of the funicle varying to dusky black.

the combined lengths of the distal three joints, about one and three quarters times the lengths of the second joints, that of the cephalic tarsus somewhat longer, bent at its proximal third, the hairs on its ventral surface forming a strigil with the curved, forked tibial spur of the cephalic tibia; the tines of the fork of the latter are unequal. Cephalic tibiae and femora subequal in length, the tibiae of the other legs longer than the femora. Caudal coxae more elongate-conical than those of the other legs, which are somewhat globular. Tibial spurs single.

Lateral ocelli somewhat their own width from the respective eye margins, farther apart from each other than each is from the cephalic ocellus.

Sculpture of the body not conspicuous, apparently absent, the abdomen smooth, the scutellum with the usual transverse line of minute foveae near its tip, curving with the margin at that point, the metanotum comparatively simple, apparently without carinae; parapsidal furrows distinct, complete; along the median line the scutellum and mesoscutum are subequal, the posterior margin of the latter nearly straight, slightly convexed. Metathoracic spiracle minute, like a point, round. Vertexal carina present, complete. Abdomen conic-ovate, the ovipositor slightly exerted, or rather its valves.

Antennae widely separated, inserted near the margins of the eyes, 9-jointed, the funicle nearly filiform, ending in a very large, solid, ovate club joint; pubescence not conspicuous. Scape dilated ventrad, longer than the pedicel and wider, subequal in length to the second funicle joint. Pedicel obconic, subequal in length to the proximal funicle joint but much wider and slightly longer. First three funicle joints equal in width, slender, cylindrical, the first and second long or moderately long, the third short; first funicle joint twice the length of the fourth, which is the shortest funicle joint, but only two thirds the length of the second joint which is the longest funicle joint, slightly curved, over twice the length of the short third joint of the funicle and about thrice the length of the fourth; third joint longer than wide but abruptly shorter, about a fourth longer than the fourth joint; the latter shortest yet longer than wide, slightly wider, ovate-quadrangle; fifth and sixth joints cylindrical oval, each lengthening slightly, the third joint intermediate in length between them. Club abruptly very large, as long as the combined lengths of the first two funicle joints. The club with several conspicuous, short, longitudinal grooves along the side of one aspect and also leading from the apex. In unmounted specimens the antennae nearly hispid, with short, whitish hairs.

(From 10 specimens, two thirds inch objective, one inch optic, Bausch and Lomb.)

Male.—The same but having the pallid yellow of the legs dusky yellow, the antennae dusky black excepting the pallid yellow scape and pedicel; and moreover differing in the shorter, more rounded abdomen, the lesser number of lines of discal ciliation of the fore wing (4 or 5 lines)* and in the longer, filiform, slender antennae.

Antennae 13-jointed, normal, the pubescence moderately sparse, the longitudinal striae of the funicle joints (2-10) visible but not conspicuous, the distal

* But in one specimen only.

angles of those funicle joints acute; scape equal to the pedicel and proximal funicle joint combined, more slender than in the female; pedicel obconic, subequal in length to the following joint or slightly shorter, wider than the scape; funicle joints all about equal in length and width but slightly lengthening distad, 9 and 10 longest; in regard to the former, joints 3 to 10 subequal, the second joint somewhat shorter and the first shorter still, about a fifth shorter than joint 3; club joint long-ovate, equal to funicle joint 2, hence shorter than joint 10 of the funicle. Petiole of abdomen as long or longer than the caudal coxæ.

(From 2 specimens, two thirds inch objective, one inch optic, Bausch and Lomb.)

Described from the following specimens: One slide labelled "W. 1892.^a F. M. Webster. Wooster, Ohio; Urbana, Illinois. Reared with *E. cragrostidis*. (1) *Oligosita americana* Ashm. (2) *Polynema citripes* Ashm." and bearing 1 ♂, 1 ♀ of the latter and two pairs of an undescribed species of *Westwoodella*; original material; names in Ashmead's handwriting. One male and two females, formerly tag-mounted, now remounted in xylol-balsam (1 slide), from the U. S. National Museum collection, labelled "Bred from *Eurytomocharis cragrostidis*. Urbana, Illinois, F. M. Wester," arranged in the collection with the following specimen. One female from the same collection and similarly remounted bearing the labels in the late Dr. Ashmead's hand, "*Cosmocomia citripes* Ashm. Type", "Type" and "Ind.," evidently original material but not type material as the label was yellow, not red, like those used by the National Museum, and the specimen bore no number and is not entered in the catalogue of types. One slide bearing two females received for identification from Dr. L. O. Howard, labelled "collected with Thrips on carnations from Nashville, Tenn. 9-12-09. H. F. Wilson." Designated as homotypes. Three females on a slide with other miscellaneous mymarids labelled "Urbana, Illinois, July 1, 1910, sweeping. Girault." Finally, a slide bearing a single female labelled "*Polynema citripes* Ashmead. Centralia, Illinois, window, August 25, 1909. Girault." Homotype.

Habitat.—United States—Illinois (Urbana, Centralia); Indiana; Tennessee (Nashville); Ohio (Wooster); Florida.

Homotypes.—Cat. No. 13,453, United States National Museum, Washington, D. C., 2 ♀s in xylol-balsam, 1 slide. (Nashville, Tenn. See preceding.) Accession No. 44,175, Illinois State Laboratory of

Natural History, Urbana, Illinois, 1 ♀ in xylol-balsam, 1 slide. (Centralia, Illinois, 25 August, 1909. See preceding list of specimens.)

A species unique in having the slender wings and the long marginal cilia of the fore wings distinctly longer than the greatest width of those wings. By this characteristic alone it is easily separated from all other described species of the genus. Common in Illinois and *probably* parasitic on jassid eggs in wheat straw (*Dorycephalus platyrhynchus* Osborn?). Consult the analogous case of *Westwoodella americana* in the reference to Girault, 1909, given on a preceding page, though Webster (l. c.) regarded it as a probable parasite of *Isosoma hordei* (Harris).

The following list of species has been described* since Dalla Torre's catalogue (1898) and brings his list up to date:

1. **Polynema maculipes** (Ashmead).
Cosmocoma maculipes Ashmead,
Canadian Ent., XIX, 1887, p. 3. (U. S.) (Not listed by de Dalla Torre.)
2. **Polynema magniceps** Ashmead.
Transactions Ent. Soc. London f. 1900, pp. 263-266. (Grenada.)
3. **Polynema grenadense** Ashmead.
Ibidem, p. 266. (Grenada.)
4. **Polynema albicoxa** Ashmead.
Ibidem, p. 266. (Grenada.)
5. **Polynema needhami** Ashmead.
Ent. News, XI, 1900, p. 617. (U. S.)
6. **Polynema hawaiiense** Ashmead.
Fauna Hawaiiensis, 1901, I, pt. iii, p. 332. (Hawaii.)
7. **Polynema brasiliense** Ashmead.
Memoirs Carnegie Museum, I, 1904, p. 521. (Brazil.)
8. **Polynema rufescens** Ashmead.
Ibidem. (Brazil.)
9. **Polynema bergi** Ashmead.
Ent. News, XVI, 1905, p. 214. (Russian Turkestan.)
10. **Polynema picipes** Girault.
Psyche, XII, 1905, pp. 91-92. (U. S.)
Polynema picipes Girault (nom. emend.).
11. **Polynema reduvioli** Perkins.
Bull. No. 1, Division Ent., Hawaiian Sugar Planters' Association, 1905, pp. 196-197, plate XII, figs. 3, 3a; XIII, fig. 7. (Hawaii.)

* There is also a *nomen nudum*, *Polynema citripes* Ashmead, now known to be *P. longipes* Ashmead. (See preceding.)

12. *Polynema bifasciatipenne* (Girault).*Stichothrix bifasciatipennis* Girault.

Psyche, XV, 1908, pp. 115-117. (U. S.)

A large number of the species of this genus are poorly described; as a matter of fact it is difficult to distinguish the species in this genus without mounting them in balsam and studying the characters afforded by the fore wings, their relative shape and size and the amount and quality of their discal ciliation; there are also other good sculptural characters on the metathorax, but coloration is too variable for specific characters in most instances.

DESCRIPTIONS OF SOME NEW HEMIPTERA- HETEROPTERA.

BY H. G. BARBER,

ROSELLE PARK, N. J.

***Jalysus elongatus*, new species.**

Longer than *J. spinosus* Say, pale ochraceous in color. Head twice as long as broad, armed at vertex with a long, acute, cylindrical spine which usually projects horizontally beyond apex of head. This spine in a few cases is deflexed at apex. Post-ocular part of head much longer than in *spinosus*, as long as the width of the anterior margin of the pronotum; area back of the transverse groove smooth; a longitudinal, smooth, callosed line just above the eyes. Head beneath with a series of fine punctures beside the buccal groove and with a smooth pale-yellow, callosed line running from beneath the eyes to the anterior edge of the pronotum, suffused with a light piceous streak either side of this line. First joint of rostrum three fourths as long as head. Antennæ similar in character and color to *spinosus* but with the apical joint relatively narrower. Pronotum over twice as long as wide, closely and coarsely punctate dorsally and laterally except on the two oval cicatrices and on the three longitudinal callosed ridges which are arranged as follows: lateral ones, distinct from anterior margin to rounded humeral elevations, median carina not elevated behind, evanescent before posterior declivity. Spine of scutellum depressed, almost horizontal. Clavus and subclaval area of hemelytra punctate, these verging posteriorly into shallow areoles; remainder of hemelytra and membrane transversely rugulose between the prominent nervures and there subhyaline. Very acute and prolonged apex of corium reaching well beyond middle of membrane, not tipped with black. Abdomen beneath impunctate, unicolorous in ♀ and reddish brown in ♂. Pleural pieces of meso- and metasternum coarsely and closely punctate. Metapleural spines relatively shorter

and not quite so acute as in *spinosus*. Legs similar to those of *spinosus*, with apex of hind femora passing apex of abdomen; tarsi fuscous. Length of ♂'s, 9 mm.; ♀'s, 9-10 mm.

Described from seven males and twelve females collected by me in the Huachuca Mountains, Arizona, in August, 1905.

The meager description of *Ncides caducus* by Distant (Biol. Cent. Am. Rhynch., I, Append., p. 460, 1893) from Mexico, answers so far as it goes for this species and it may turn out upon comparison with the type to be Distant's species.

The three United States species of the genus *Jalysus* Stål may be differentiated as follows:

Scutellar spine not vertically elevated.

Head armed with a long, horizontal, sharp, cylindrical spine, surpassing apex of head.....*elongatus* n. sp.

Scutellar spine elevated vertically.

Vertex of head armed with a short, erect, blunt spine. Scutellar spine almost vertical.....*multispinosus* Ashm. (*perclavatus* Van D.).

Vertex of head unarmed with a spine but provided with an abruptly ending sharp keel. Scutellar spine inclined at an angle of 45°.

spinosus Say (*wickhami* Van D.).

Jalysus (Hoplinsus) multispinosus Ashm. is the smallest member of the genus thus far described and seems to be widely distributed. It was described by Mr. Ashmead from Florida and, owing to his poor characterization, was recently redescribed from Florida material by Mr. Van Duzee as *perclavatus*. I have taken this species in Langdon, Mo., Huachuca Mountains, Ariz., and Lakehurst, N. J. Mr. Nathan Banks has taken it about Washington, D. C. *J. spinosus* is widely distributed, as I have specimens from Dilly, Oregon, Inyo Mountains, Calif., Nebraska, and from numerous points in the east, where it is common. *J. Wickhami* Van D. is a small *spinosus*, specimens of which I have received from Mr. Wickham collected in the Inyo Mountains, Cal. Mr. Van Duzee has compared my specimens with his type and agrees to have no quarrel with me if I place his species as a synonym of *spinosus*, although he prefers to call it a variety.

Sphærobolus quadristriata, new species.

Black, head and anterior lobe of prothorax shining, these impunctate, minutely wrinkled but not setose as in *insignis* Uhl. and considerably larger than that species. Projecting tylus reaching two thirds the length of the basal

joint of the antennæ. Head but little exerted and narrowing rather sharply behind the eyes. Antennæ piceous with apex of third joint and fourth infuscated; the second joint one third longer than third, fourth three fourths as long as third. Head beneath impunctate, minutely wrinkled with apex of basal joint of rostrum about reaching base of head. Pronotum provided with a distinct but narrow callosed collar which is dull piceous; anterior lobe is a trifle wider than long and two and one half times as long as the posterior lobe, which is flattened and dull piceous, rather finely but not closely punctate; humeral angles elevated, smooth and slightly paler; sinus of constriction, at side especially, not sharp angled as *insignis* but more rounded at bottom and there suffused with dull black. Scutellum dull sooty black, narrow, acute, almost impunctate and extreme tip pale; posteriorly subcarinate. Corium dull fuscous or sooty black, not setose or hairy, with four smooth dirty white striæ, converging towards the base, arranged as follows: one on the outer margin of the clavus, extending two thirds its length, one just outside the clavus, extending a little longer and two of equal length between exterior vein and costal margin, reaching a little behind middle of corium. Just before apex of corium and not attaining costal margin, a triangular impunctate pale spot. Infuscated part of clavus and corium with a few punctures arranged somewhat in linear series. Corium abbreviated, membrane extending just past middle of fifth abdominal segment. Membrane fuscous, with basal interior angle and minute spot at external angle, pale; extreme tip transversely pale, with veins indistinct. Beneath black, with meso- and metapleural pieces dull, these next the coxæ and the posterior concave lateral margins of metasternum pale; the propleura very finely and sparsely punctured, shining. Venter subshining but covered with very fine closely appressed, grayish pubescence. Legs piceous brown, paler at base of coxæ, femora and tarsi. Thickened anterior femora provided on apical half with two or three stronger and several intermixed, smaller teeth. Tibiæ furnished with stiff bristles. Length of ♂, 7.5 mm.

Described from three males taken at Lakehurst, N. J., by Mr. Wm. T. Davis and myself on July 4, 1909, and September 7. It seems to be rare. I have seen this in collections labelled *S. insignis* Uhl, which is, however, a strictly western species, specimens of which in my collection are from Spearfish, S. Dak., and Glen, Sioux Co., Nebr.

PSEUDOCNEMODUS, new genus.

Very similar and with many of the characters of *Cnemodus* H. Schf. from which it chiefly differs by the presence of ocelli; post-ocular margins of head more swollen; collar of pronotum narrower and not so sharply demarked; posterior lobe of pronotum wider than anterior; fore femora more incrassate, basal part of fore tibiæ in male above spine nearly straight, with this spine nearer apex than

base of tibiae; middle femora of males provided with four or five strong teeth; anterior lobe of pronotum punctate. Head and pronotum provided with a few long setae. Posterior margin of pronotum not so sinuated above base of scutellum.

***Pseudocnemodus bruneri*, new species.**

Smaller and more shining than *Cnemodus mavortius* Say. Dark castaneous, with post-ocular margins of head more swollen and with fore femora more incrassate. Head dull dark castaneous, closely punctured, not pubescent but provided with a few long setae. Tylus lighter colored. Head shaped much as in *mavortius* but the post-ocular and ante-ocular portions to base of antennae subequal. Swollen post-ocular part distinctly wider across than the collar of the pronotum. Apex of head almost reaching the middle of basal joint of antennae, which is about two thirds as long as second: third segment apically thickened and apical three fourths fuscous, about three fourths the length of second; fourth segment a trifle longer than third and colored reddish-brown. First joint of rostrum nearly reaching base of head. Head unicolorous beneath, subshining, with a few fine scattered punctures. Collar of pronotum short and not sharply demarked, there closely punctured. Anterior lobe shining, with scattered punctures on the disc, a little longer than wide and about two and one half times longer than the posterior lobe, which is dull paler castaneous, more closely punctate and wider than the anterior lobe. Humeral angles callosed, smooth, pale. Seen from the side, the posterior part of this lobe is elevated to the height of the anterior lobe. Posterior margin of pronotum not so concave as in *C. mavortius*. Scutellum dark castaneous or piceous, not closely punctate, pale at acute apex and with apical half distinctly keeled. Corium wider than the abdomen, dark castaneous, verging to piceous in dark specimens, not closely punctate except without exterior vein, not very shining. Wide costal margin strongly reflexed, pale yellow, impunctate. Membrane incomplete, infuscated, reaching base of sixth abdominal segment, provided with about four sinuous veins. Genital segment of male seen dorsally more concave than in *C. mavortius*. Pleural pieces rather closely and coarsely punctured, shining. Exterior apical angle of metasternum and coxal plates pale stramineous. Venter shining castaneous, with very fine hairs on the disc. Connexivum beneath paler. Legs shorter than in *C. mavortius*, pale stramineous, with shining anterior femora relatively shorter and more swollen, and provided with two rows of five or six larger equidistant spines, with a few minute ones nearer apex. Fore tibial spine of male placed nearer apex than base of tibia, the basal part nearly straight. Middle femora of male armed with three or four stout, acute teeth. Precoxal tooth acute, horizontal. Hind femora unarmed. Apical half of fore femora and tibiae, apex of second and third femora more faintly fuscous. Length of ♂, 5.5 mm.; ♀, 6 mm.

Described from fourteen males and fifteen females collected by me in Falls City, Nebraska, August 30, 1910; two females taken by

Mr. William T. Davis at Lakehurst, N. J., July 11, and one female in the collection of Mr. Nathan Banks from Black Mountain, N. C., May. The specimens from Falls City, Nebr., were collected under old railroad ties which had been lying along the grassy embankment of the road for three or four weeks, beneath which the vegetation was not yet dead. A few of the specimens are much darker, verging into piceous. The two females from Lakehurst, N. J., are larger and paler than the Nebraska and Black Mountain ones, with the antennæ and legs not infuscated. I have named this species for my friend Professor Lawrence Bruner, State Entomologist of Nebraska, to whom I am much indebted for past favors.

ESURIS Stål.

As this genus is new to the United States, it may be well to give its chief diagnostic characters, which are as follows: species small, having the hemelytra incomplete and destitute of a membrane, with the clavus and corium connate. Anterior femora incrassate and armed beneath with a few small teeth. Body sparsely setose. Ocelli absent.

This genus was erected by Stål (Enum. Hem., IV, 164, 1874) to include his formerly described *Rhyparochromus tergina* from Brazil, since which time Distant (Biol. Cent. Am. Rhynch., I, 410, 1893) has described a species, *E. purpurata*, from Guatemala, but the description is so incomplete that it will be difficult to fix it without an examination of the type.

Esuris castanea, new species.

Castaneous, rather thickly grayish hirsute, subshining, with posterior margin of pronotum and corium paler. Membrane entirely missing. No veins on the corium and clavus not differentiated. Head, pronotum and corium transversely convex.

Head large, not at all exserted, about as wide as the pronotum at posterior margin, closely and coarsely punctured. Fore part of head very declivous, with the tylus almost vertical. Two long setæ are placed next the eyes on the lateral margins of head. Antennæ pale ochraceous, unicolorous, short setose, basal joint attaining apex of head, second and fourth subequal, third a trifle shorter. First joint of rostrum nearly reaching base of head. Pronotum without a collar, anterior margin straight, the whole surface closely and coarsely punctate, finely grayish hirsute; the narrow posterior margin pale and almost straight across. The pronotum is a trifle wider than long and is widest one third of its length from the anterior margin, slightly narrowing posteriorly to be obtusely and very shallowly constricted one sixth its length from the

posterior margin; anterior lateral margins lightly carinated. Scutellum equilateral, convex dorsally, color of pronotum, anteriorly at least, closely and finely punctured. Hemelytra lighter castaneous and wider across than the pronotum, wider than the abdomen, with very narrow lateral margins slightly deflexed, at least anteriorly, over the connexivum. Line of meeting of the two hemelytra straight, about twice as long as scutellum, posterior narrowly pale, smooth margins very slightly oblique, with the interior angle obtuse, outer obtuse angle reaching apex of fourth abdominal segment. Membrane entirely absent. Corium and clavus united. Veins of corium absent. Hemelytra provided with small, closely set punctures, arranged in linear series, each puncture provided with a minute gray hair, making the whole surface appear minutely hirsute. Abdomen dorsally shining, dark, castaneous. Connexivum reflexed, unicolorous. Beneath castaneous, abdomen usually darker and more shining. Pleural pieces finely and rather closely punctate. Femora castaneous. Tibiæ and tarsi pale ochraceous. Anterior femora much thickened, armed beneath with three or four small teeth. Length, ♂'s and ♀'s, 2 mm.

Described from ten males and twelve females collected by me near the Huachuca Mountains, Ariz., where they were very common under dried cow chips.

ARAPHE H. Schf.

Japetus Distant, Biol. Cent. Amer. Rhynch., I, 227, 1883.

After carefully studying Distant's description of his genus *Japetus* I am convinced that it is synonymus with *Araphe* H. Schf., for the characters given by Distant do not generically differentiate this genus. Furthermore, an examination of the new species, here described, shows that it is closely related to *J. sphaeroides* Dist. from Guatemala and yet without any doubt belongs to the genus *Araphe*.

The United States species of this genus may readily be separated by the following synoptic table:

Head, pronotum and legs long pilose.

Head and thorax coarsely punctate.....*carolina* H. Schf.

Head and thorax impunctate, membrane wanting.....*cicindeloides* Walk.

Head and pronotum not hairy, head impunctate.....*mimetica* n. sp.

Araphe mimetica, new species.

Black, much resembling *A. cicindeloides* Walk. but is considerably smaller. Head and pronotum devoid of long pile but face provided with minute appressed cinereous pubescence, with a few longer hairs at tip of tylus. Head globose, impunctate, finely rugulose and seen from above not so convexed behind the eyes as in *cicindeloides*, much wider than the pronotum. Rostrum reaching fore coxæ; first segment as long as the ante-ocular part of head. Antennæ with two or three short setæ at apex of joints, the first joint

longer than the others and reaching far beyond apex of the head, second joint three fourths the length of the first and a third longer than the third, fourth a trifle longer than the second. Pronotum much narrower than the head, with the anterior lobe globose, covered with very finely closely appressed tomentose, cinereous pubescence similar to that on the face. The velvety black, flattened, posterior lobe is about one half the length of the anterior and scarcely wider. The transverse furrow between the two lobes obtusely rounded at bottom and there provided with a few scattered black punctures. Scutellum, clavus and corium velvety black, not pilose. Scutellum narrow, acute, impunctate. Corium wider than the abdomen, with basal half and exterior apical angle pure white; subcostal area with a row of unicolorous coarse punctures. Membrane smoky black, crossed at base with a broad curved white band; tip of membrane reaching middle of fifth abdominal segment; veins imperceptible. Connexivum reflexed. Apex of male genital segment, seen dorsally, symmetrically rounded. Wings aborted. All beneath and legs shining black. Pleural pieces, venter and legs with more or less appressed, tomentose, cinereous pubescence. Exterior apical angle of metasternum white. Fore and middle tarsi fulvopiceous. Fore femora thickened, provided with one or two very small subapical teeth. Length, ♂ 5.5 mm.; ♀ 7 mm.

Described from sixteen males and seven females collected by me in the Huachuca Mountains, Arizona. These were found very common in company with *A. cindeloides* running about among the dead leaves beneath the trees, imitating very closely, especially in their larval and nymphal condition, some of the numerous black ants.

***Alydus rufescens*, new species.**

Relative proportions the same as a narrow *eurinus* but somewhat smaller than that species, to which it is closely related. General color of head and anterior one third of pronotum and scutellum dull black. Posterior two thirds of pronotum and hemelytra fulvous, tinged with pink and provided with fine fuscous punctures and in the darker specimens these parts suffused with fuscous. Bronzy black beneath, with lateral margins of the venter to beyond the stigmata rufescent. Head with a few short scattered hairs on the face; transocular width equal to that of the pronotum. Collum in the center, over twice the width longitudinally of the sharply demarked collar of the prothorax. Rostrum and antennae similar to those of *eurinus*. Pronotum with finely but distinctly impressed lateral margins pale, with punctures finer and not so closely set as in *eurinus* and a narrow, median, longitudinal black line running from the blackened anterior portion almost if not quite to the posterior margin. Surface almost devoid of pile or hairs. Humeral angles rounded, not prominent. Scutellum velvety black, with an acute, pale apex and a few large punctures in the surface, more abundant laterally. Corium fulvous-brown, non-pilose, with its extended acute apex extending to middle of membrane, which is sooty brown. Veins are but little branched. Abdomen dorsally bright red, with the sixth segment black. Beneath with head and thorax somewhat

shining, the former almost smooth; the latter, for the most part, coarsely punctate. Venter dull bronzy black, provided with scattering, pale, appressed hairs, intermixed with which are some longer setæ. Lateral margins to beyond the stigmata rufescent. Occasional specimens have traces of red on the disc of the venter, especially anteriorly. Individuals also occur which have the lateral rufescent band broken up, leaving a spot at each incisure, red. Melanic individuals occur which have the pronotum and hemelytra infuscated all over. Legs with femoræ black, almost devoid of pile, a few short, stiff hairs on the tibiæ. Tibiæ are pale except at extreme base and apex. Basal two thirds of tarsi pale. About four long spines on the hind femora, with two short, blunt subapical teeth. Length of ♂, 10 mm.; ♀, 11 mm.

Described from twenty-five males and five females collected by me in the Huachuca Mountains, Arizona, in 1905. They were observed on the hillside of a canyon, flying about among the dead leaves and on the bare ground beneath the stunted oak trees. They presented a very peculiar appearance as they flicked their wings, exposing the bright red abdomen, and behaving very much as some of the Mutillidæ do.

- 1 (2). Lateral margins of pronotum callosed, impunctate, pale. Humeral angles of pronotum acute.....*pilosulus* H. Schf.
- 2 (1). Lateral margins of pronotum thinly impressed, rarely pale. Humeral angles obtuse or rounded.
- 3 (4). Membrane pale, spotted with brown. Hairs sparse on the pronotum. Scutellum velvety black, with smooth, callosed, rounded apex.
conspersus Mont.
- 4 (3). Membrane usually dark, not spotted with brown. Scutellum pale, acute, not specially callosed.
- 5 (6). With nervures of membrane somewhat anastomosing. Hind femora provided with a pale annulus before apex.
scutellatus Van D.
- 6 (5). With nervures not anastomosing and but little branched.
- 7 (12). Pronotum coarsely punctate, usually black or bronze black species.
- 8 (11). Abdomen beneath bronze black. Connexivum with pale spots at incisures.
- 9 (10). Head, pronotum and legs furnished with rather close set, long pile.....*eurinus* Say.
- 10 (9). Head, pronotum and legs furnished with shorter and sparser hairs. Form more robust. *pluto* Uhl.
- 11 (8). Abdomen beneath pale. Hind coxæ set further apart than in *eurinus*.....*setosus* Van Duz.
- 12 (7). Pronotum more finely punctate, fulvous brown. Abdomen beneath bronze black, with ventral margin, broadly rufescent.
rufescens n. sp.

I have never seen specimens of Van Duzee's two species and the diagnostic characters are taken from his description. *A. pluto* Uhl., if a distinct species, is difficult to characterize except with comparison to *A. curinus*. I have seen *A. conspersus* Mont. confused in collections with *Tollius curtulus* Stål, which I have taken at Kingsbridge, N. Y.

A GENERIC SYNOPSIS OF THE ITONIDÆ.

BY E. P. FELT,

ALBANY, N. Y.

As there is no complete synopsis of this group, better known as the Cecidomyiidae, extant we take this opportunity of presenting, in a summary form, the results of our studies of American species, many of the types of European genera and a close examination of the literature describing other forms.

Subfamily LESTREMIINÆ.

Small, dark brown or black species. Tarsi quinquearticulate, the first segment longer than the second; fourth vein usually present, forked, or simple; crossvein distinct; antennæ moderately developed or greatly reduced; circumfili never present.

Tribe LESTREMINARIÆ.

This tribe is distinguished from the following by the fourth vein being forked.

Genus CATOCHA Halid. 1833, type *C. latipes* Halid.

Costa continuous and extending beyond the apex of the wing. Antennæ with 11 or more segments, the second not plainly enlarged. Synonyms: *Furcincerva* Rond. 1846 in part, *Macrostyla* Winn. 1846. Europe, North America.

Genus LESTREMIA Macq. 1826, type *L. cinerea* Macq.

Costa not attaining the apex of the wing, practically disappearing at its union with the third vein. Male with 16, female with 11 antennal segments, the second not plainly enlarged. Synonyms: *Cecidogona* Loew 1844; *Furcincerva* Rond. 1846 in part; *Mimosciara* Rond. 1846; *Yposata* Rond. 1856; *Molobraea* Rond. 1860. Europe, North and South America, Australia.

Genus **MICROCERATA** Felt 1908, type *Micromyia corni* Felt.

Antennæ greatly reduced, only 8 to 10 segments, the second greatly enlarged, globose, the two branches of the fourth vein nearly even. North America.

Genus **TRITOZYGA** H. Lw. 1862, type *T. sackeni* n. sp.*

Male.—Antennæ short, 9 segments, the second ovate, the fourth with a length a little greater than its diameter; terminal segments compound, formed by the fusing of three segments. Palpi probably quadriarticulate, the third and fourth each with a length about four times its diameter. Wings as figured by Loew. Tarsi quinquearticulate, the first longer than the second. Type in the Museum of Comparative Zoölogy.

Distinguished from the above by the asymmetrical branches of the fourth vein. North America.

Genus **LITHOMYZA** Scudd. 1877, type *L. condita* Scudd.

Fourth vein forked as in *Lectremia*. Antennæ with 9 segments. A fossil form evidently having a close affinity to the two preceding genera. Fossil, North America.

Tribe *CAMPYLOMYZARLE*.

This tribe is separated from the preceding by the simple, nearly obsolescent fourth vein or its absence.

Genus **STROBLIELLA** Kieff. 1897, type *S. intermedia* Kieff.

Wingless, or if wings are present, the fifth vein simple. Claws with long, parallel teeth, the pulvilli very short. Europe.

Genus **WASMANIELLA** Kieff. 1897, type *W. aptera* Kieff.

Female wingless. Distinguished from the preceding genus by the denticulate claws and the rudimentary or obsolescent pulvilli. Europe.

Genus **JOANISSIA** Kieff. 1894, type *J. aurantiaca* Kieff.

Third vein usually well separated from costa and frequently uniting therewith at or beyond the apex; fourth vein present. Antennal segments 14 in the male, 11 in the female, globose, stemmed and ornamented only with irregular whorls of long hairs. Palpi tri- or quadriarticulate. Europe, North America.

Genus **PEROMYIA** Kieff. 1894, type *P. lezeillei* Kieff.

Distinguished from the above by the 14 antennal segments of the male, the 13 in the female and the biarticulate palpi. The claws are strongly bent and dilated subapically. Europe.

* *Tritozyga sackeni*, new species.

Genus MYCOPHILA, new genus, type *M. fungicola*, n. sp.*

Male.—Length, 0.6 mm. Antennæ as long as the body, thickly haired, fuscous yellowish; 12 segments, the fifth with a stem one third the length of the subcylindric basal enlargement, the latter with a length one half greater than its diameter; subbasal whorl of setæ short, scattering; subapical band of setæ long, curved. Palpi indistinct; three ocelli. Mesonotum fuscous. Scutellum, post-scutellum, pleuræ and venter of abdomen reddish, the dorsal sclerites a variable fuscous; subcosta uniting with costa before the basal half, the third vein a little before the apex; fourth vein obsolete distally, fifth forked. Halteres pale yellowish. Legs fuscous yellowish; claws simple, pulvilli rudimentary. Reared from mushrooms.

Type Cecid 1320, N. Y. State Museum.

Allied to *Joanissia* Kieff. and *Peromyia* Kieff. Fourth vein rudimentary, obsolete distally, the male with 12, the female with 9 antennal segments, the flagellate segments cylindric, subsessile. North America.

Genus TRICHOPTEROMYIA Will. 1896, type *T. modesta* Will.

Location provisional; distinguished from the two preceding genera by the absence of the fourth vein. West Indies.

CERATOMYIA, new genus, type *C. johannseni*, new species.†

Male.—Length, 1.5 mm. Antennæ very short, composed of six segments, the first obconic, the second greatly swollen, subglobose, both fuscous, the remaining four segments a light fuscous yellowish, obpyriform, sparsely clothed with irregular, stout setæ, the third segment obpyriform, with a length a little greater than its diameter, the fourth a little shorter, the fifth with a length nearly three fourths greater than its diameter, the sixth produced, with a length fully twice its diameter and tapering to a narrowly rounded apex; each segment with a stout, chitinous subapical process, those on the fifth and sixth segments at least, greatly swollen basally and with a length nearly equal to that of the segment. Palpi; first segment greatly enlarged, pyriform, with a length one half greater than its diameter, the second greatly produced, dilated apically, with a length six times its diameter, the third less than one half the length of the second, fusiform; all sparsely haired. Mesonotum, scutellum and post-scutellum apparently a nearly uniform fuscous yellowish. Abdomen a fuscous whitish, the genitalia yellowish. Wings hyaline, costa light brown, subcosta uniting therewith near the basal third, the third vein, joined to the distal fifth of the subcosta by a distinct cross-vein as in *Micromyia*, unites with the margin of the wing at the apex, the fourth vein wanting, the fifth uniting with the posterior margin near the distal third, its branch at the basal fourth. Legs fuscous yellowish, the first tarsal segment with a length nearly

* *Mycophila fungicola*, new species.

† *Ceratomyia johannseni*, new species.

equal to that of the two following relatively short, quadrate segments, the fourth and fifth subquadrate; claws slender, very strongly curved, simple, the pulvilli as long as the claws. Genitalia: basal clasp segment long, tapering slightly; terminal clasp segment rather stout, with a length three times its diameter, tapering distally, one apparently deformed and with a second rudimentary terminal clasp segment; dorsal plate broad, broadly rounded apically; ventral plate indistinct; style triangular, tapering to a narrowly rounded apex.

Received from Ocotlan, Mexico, through Dr. O. A. Johannsen under date of December 12, 1910.

Type Cecid 1388, N. Y. State Museum.

Allied to *Micromyia* Rond. on account of the greatly enlarged second antennal segment, though easily separated therefrom by the absence of the fourth vein. The latter character indicates a relationship with *Trichopteromyia* Will. from which it may be separated by the greatly reduced antennæ, with only six short, sessile segments. North America.

Genus MICROMYIA Rond. 1840, type *M. lucorum* Rond.

Third vein uniting with costa before the apex. Antennæ very short, 10 or 11 segments in the male, 8 in the female, the second greatly enlarged, the flagellate segments sessile in both sexes. Palpi quadriarticulate. Europe.

Genus CAMPYLOMYZA Meig. 1818, type *C. flavipes* Meig.

Antennal segments not very short, the second not greatly enlarged, the male with 14, the female with 11-22 segments, the flagellate ones ornamented with crenulate whorls or other structures more complex than irregular whorls of simple hairs. Synonym: *Neurolyga* Rond. 1846. Owing to the unsatisfactory characterization of the type species, this genus is tentatively given supergeneric rank and the following genera or subgenera separated therefrom. Europe, North America, Australia.

Genus PRIONELLUS Kieff. 1894, type *Prionota pini* Kieff.

Distinguished from forms having the general characters of *Campylomyza* by the more or less distinct subapical collar on the flagellate antennal segments and the denticulate claws, the pulvilli being well developed. Synonym: *Prionota* Kieff. Europe.

Genus APRIONUS Kieff. 1894, type *Apriona bidentata* Kieff.

Distinguished from the preceding genus by the simple claws and the short or rudimentary pulvilli. Europe.

Genus **MONARDIA** Kieff. 1895, type *M. stirpium* Kieff.

Males with 14 or 16 stemmed antennal segments, females with 11-22. This genus is most easily recognized by the subapical whorls of stemmed disks on the flagellate antennal segments, especially in the females. The claws, according to Kieffer, have a minute, subapical tooth. Europe, North America.

Genus **BRYOMYIA** Kieff. 1895, type *B. bergrothi* Kieff.

Distinguished from the preceding by the subapical reniform processes on the flagellate antennal segments. Claws bent at right angles, dilated subapically. Europe.

Genus **CORDYLOMYIA**, new genus, type *C. coprophila*, new species.*

Male.—Length, 1.25 mm. Antennae with 14 segments, the fifth with a stem three fourths the length of the cylindric basal enlargement, which latter has a length about three fourths its diameter, a thick subbasal whorl of setae and on the apical half, three crenulate whorls, the distal two rudimentary; apically an irregular group of short, stout, curved, chitinous spines. Palpi quadri-articulate. Mesonotum dark brown. Scutellum and abdomen brown. Claws strongly curved, simple, the pulvilli longer than the claws. Basal and terminal clasp segments stout, the latter swollen near the middle. Dorsal plate short, broadly rounded. Harpes apically with five or six stout, recurved spines.

Female.—Length, 1 mm. Antennal segments 11, the fifth subsessile, with a length one fourth greater than its diameter; subbasal whorl sparse, the subapical band of setae short, scattering. Ovipositor short, the terminal lobes probably triarticulate.

Type Cecid 890, N. Y. State Museum.

Antennal segments 11 or 12 in the female, 14 in the male, the flagellate segments bearing subapical, frequently thick whorls of short, stout, occasionally recurved spines. North America.

Genus **CORINTHOMYIA**, new genus, type *Campylomyza hirsuta* Felt.

Antennal segments 14 in the male. Distinguished from preceding forms by the series of subequal whorls of stout, curved setae on the subsessile flagellate antennal segments. Pulvilli as long as the claws. North America.

Subfamily HETEROPEZINÆ.

A small group of peculiar forms, some being most remarkable on account of the great degree of specialization by reduction. The metatarsus is usually longer than the following segments. There are at

* *Cordylomyia coprophila*, new species.

least three long veins, the cross-vein is wanting in most forms, the circumfili are absent.

Genus MEUNIERIA Kieff. 1904, type *M. succini*, new name proposed for the *Miastor du succin* of Meunier.*

An Amber form with quadriarticulate tarsi, the metatarsus being longer than the second segment; three long veins; palpi quadriarticulate. Location provisional.

Genus PALÆOSPANIOCERA Meun. 1901.

This name was proposed without indication of type for an amber species having three simple, long veins, the third simple, the tarsi quadriarticulate, the metatarsus longer than the second segment. Antennæ with 13 segments; palpi triarticulate. Body ovoid, elongate, the thorax slightly gibbous, the ovipositor with a conspicuous lobe. Apparently related to *Meunieria* Kieff. and *Miastor* Mein.

Genus MIASTOR Mein. 1864, type *M. metraloas* Mein.

Distinguished from the preceding by the biarticulate palpi. Europe, North America, South America, Australia.

Genus NEOSTENOPTERA Meun. 1901, type *Stenoptera kiefferi* Meun.

Wing very long, slender, with only one long vein and remarkable because of the long fringes. Tarsi quadriarticulate, the metatarsus longer than the second segment; palpi invisible. Apparently related to *Miastor* Mein., though easily separated therefrom by alar characters.

Genus HETEROPEZA Winn.† 1846, type *H. pygmaea* Winn.

Tarsi triarticulate, the metatarsus longer than the second; two long veins; the antennal segments cylindric. Europe, Australia.

Genus MONODICRANA H. Lw. 1850, type *M. terminalis* Kieff.

This amber species may be separated from the preceding by the globose antennal segments. Location provisional.

* 1901, Meunier, Fernand. Soc. Sci. Brux. Ann., 2d part, 28: 191.

† Messrs. Kunstler and Chaine in Comptes Rendus Hebdomadaires des Seances et Memoires de la Societe de Biologie, 1902, vol. 54, p. 535, give the characters of a form reared from bananas as follows: Tarsi biarticulate, the first segment longer than the second; wings with two or three long veins, the two first branched; palpi quadriarticulate. It was referred to the *Heteropeza* zinzæ, though no name was proposed and is presumably related to *Heteropeza* Winn. and *Monodicrana* H. Lw.

Genus **HAPLUSIA** Karsch 1877, type *H. plumipes* Karsch.

Tarsi quinquearticulate, the metatarsus shorter than the second segment; wing membrane finely haired, the fifth vein forked, the third extending to the apex of the wing; palpi quadriarticulate. South America.

Genus **TETRADIPLOSIS** Kieff. & Jörg. 1910, type *T. sexdentatus* Kieff. & Jörg.

Apparently allied to the preceding and easily separated therefrom by the plainly bidentate claws. South America.

Genus **JOHNSONOMYIA** Felt 1908, type *J. rubra* Felt.

Separated from the preceding form by the simple fifth vein, the sixth wanting. The palpi are quadriarticulate. North America.

Genus **CHASTOMERA** Skuse 1888, type *C. bella* Skuse.

This genus appears to be closely related to *Johnsonomyia* Felt, though easily separated therefrom by the pyriform flagellate antennal segments. It is remarkable because of the third vein being widely distant from subcosta, which latter is connected therewith at its distal fourth, the fifth vein simple. Australia.

Genus **NECROPHLEBIA** Skuse 1888, type *N. volitans* Skuse.

Appears to be closely related to the preceding, though the third vein is much nearer subcosta, the latter being united therewith near its basal third; antennal segments 14, the flagellate cylindric, with a stem one half the length of the basal enlargement. Australia.

Genus **MEINERTOMYIA**, new name, type *Pero fasciata* Mein.

A small form distinguished from the preceding by the triarticulate palpi and the third vein not extending to the apex of the acuminate wings. Synonym: *Pero* Mein. 1870, preoccupied by *Pero* H. Schf. Europe.

Genus **LEPTOSYNA** Kieff. 1894, type *L. acutipennis* Kieff.

Separated from the two preceding genera by the uniarticulate palpi. Wings acute apically. Europe, North America.

Genus **FRIRENIA** Kieff. 1894, type *F. tenella* Kieff.

Three long simple veins, the third disappearing before the tip of the wing; wing membrane finely haired; palpi biarticulate. Europe.

Genus EPIMYIA, new genus, type *E. carolina*, new species.*

Malc.—Length, 1 mm. Antennæ sparsely haired, nearly black; probably 14 segments, the fifth with a stem one fourth the length of the subcylindric basal enlargement, which latter has a length two and one half times its diameter and a sparse basal whorl of stout setæ. Palpi triarticulate. Head, mesonotum and abdomen dark brown, the basal segment of the latter fuscous yellowish. Wings hyaline, the third vein uniting with costa at the distal fourth, the simple fifth at the basal half. Halteres fuscous. Legs dark brown; claws simple, the pulvilli about two thirds the length of the claws. Genitalia: basal clasp segment stout, truncate, the ventral angle produced, setose; terminal clasp segment irregular, apically with a long, recurved spine; dorsal plate deeply and roundly emarginate, the internal angles of the lobes produced, recurved, acute; ventral plate long, narrow, broadly and roundly emarginate, the lobes produced and tapering to an obtuse, sparsely setose apex.

Type Cecid 11621, N. Y. State Museum.

Readily separated from the preceding genus by the triarticulate palpi. North America.

Genus LEDOMYIELLA Meun. 1904, type *L. succini* Meun.

An amber species with the wing membrane scaled, the fifth vein forked; tarsi quinquearticulate, the metatarsus shorter than the second segment; palpi quadriarticulate.

Genus BRACHYNEURA Rond. 1846, type *B. fuscogrisca* Rond.

Distinguished from the preceding by the three simple long veins and the triarticulate palpi. Europe, North America, Australia.

Genus OLIGARCES Mein. 1865, type *O. paradoxus* Mein.

Small species, easily separated from other allies by the biarticulate tarsi. Europe and North America.

Subfamily ITONIDINÆ.

A group comprising by far the larger number of species and including practically all of the gall-making forms. Metatarsus always shorter than the following segment, the wings with three or four long veins; circumfili present.

Tribe EPIDOSARIÆ.

A distinct cross-vein uniting the third vein and subcosta and usually parallel with costa suffices to distinguish members of this group.

**Epimyia carolina*, new species.

Genus **WINNERTZIA** Rond. 1860, type *Asynapta lugubris* Winn.

Four long veins, the fifth simple, the sixth free, the cross-vein forming a considerable angle with costa. Antennal segments 13 or 14, the circumfili in both sexes forming horseshoe-like structures on opposite faces of each segment. Synonym: *Clinorhiza* Kieff. Europe, North America, South America, Australia.

Genus **GONIOCLEMA** Skuse 1888, type *G. pauxillula* Skuse.

Apparently closely allied to the preceding genus and separable therefrom by the fifth vein being obsolete basally and apically. Australia.

Genus **DIALLECTES** Kieff. 1894, type *D. croceus* Kieff.

A large form easily separated from the preceding by the fifth vein arising from the third vein near the cross-vein. Europe.

Genus **BRYOCRYPTA** Kieff. 1896, type *B. dubia* Kieff.

Three long veins, the cross-vein oblique, the fifth forked, close to the posterior margin and uniting therewith near the basal half. The wings are not very long and narrow and the terminal clasp segment is short. Europe.

Genus **DIDACTYLOMYIA**, new genus, type *Colpodia longimana* Felt.

Easily distinguished from the preceding by the fifth vein not being close to the posterior margin and uniting therewith near the distal fourth. The terminal clasp segment is greatly produced and slender. North America.

Genus **LIEBELIOLA** Kieff. & Jörg. 1910, type *L. prosopidis* Kieff. & Jörg.

Provisionally placed next *Didactylomyia* from which it is easily separated by the presence of a supernumerary vein at the base of subcosta and the simple claws; ovipositor short. South America.

Genus **COLOMYIA** Kieff. 1891, type *C. clavata* Kieff.

Antennal segments 21 in the male, the fifth with a stem one half longer than the basal enlargement; female antennæ with 30 to 31 segments, the fifth with a stem as long as the basal enlargement; palpi biarticulate. Separated from the two preceding genera by the simple fifth vein. Europe.

Genus PALEOCOLPODIA Meun. 1904, type *P. coccinea* Meun.

Antennal segments 16, the fifth with a stem as long as the basal enlargement. Wings long, narrow, cross-vein at almost right angles to costa, the fifth vein simple, the sixth wanting. Amber.

Genus COLPODIA Winn. 1853, type *C. angustipennis* Winn.

Small species with extremely long, slender wings. Distinguished from the preceding genus by the forked fifth vein. Europe, North America, Australia.

Genus ASYNAPTA H. Lw. 1850, type *Cecidomyia longicollis* H. Lw.

Cross-vein nearly parallel with costa; four long veins, the fifth simple, the sixth free. Antennal segments 16 or more; pulvilli single, longer than the claws. Europe, North America, Australia.

Genus CLINORHYTIS Kieff. 1896, type *C. flavitarsis* Kieff.

Distinguished from the preceding genus by the 14 antennal segments, the three pulvilli being shorter than the claws. Europe, North America, Australia.

Genus RUEBSAAMENIA Kieff. 1894, type *Asynapta pectoralis* Winn.

Antennal segments of male probably 16, the fifth with a stem one half the length of the basal enlargement; the female with numerous sessile antennal segments, each with a length about equal to its diameter. Palpi quadriarticulate; ovipositor as long as the body. Venation as in the two preceding genera, from which it is distinguished by the abdomen being recurved dorsally. Europe.

Genus DICERURA Kieff. 1897, type *D. scirpicola* Kieff.

Venation similar to that of *Asynapta* H. Lw. except that the fifth vein is obsolete basally. Antennal segments 16, the fifth of the male with a stem one half longer than the basal enlargement. Palpi quadriarticulate. Ovipositor of the female short, biarticulate. Synonym: *Iridomyza* Rübs. 1899. Europe.

Genus PORRICONDYLA Rond. 1840, type *Cecidomyia albitarsis* Meign.

Three long veins, the fifth forked. Antennal segments greatly produced in both sexes, 12-16; palpi quadriarticulate. Synonyms: *Epidosis* H. Lw. 1850; *Dicroneurus* Kieff. 1895. Europe, North America, Australia.

Genus CAMPTOMYIA Kieff. 1894, type *C. binotata* Kieff.

Separated from the preceding genus by the slender abdomen, the distal segments being recurved dorsally. Europe, North America.

Genus DIRHIZA H. Lw. 1850, type *Cecidomyia lateritia* H. Lw.

Antennal segments 14, the fifth of the male having a stem one fourth the length of the basal enlargement. Wing venation as in *Porricondyla*. Separated from the two preceding genera by the antennæ not being greatly produced in both sexes. Europe, North America.

Genus LOPEZIELLA Tav. 1908, type *L. combreti* Tav.

Antennal segments 14, the fifth with a length about four times its diameter, distinctly constricted near the basal and distal thirds and ornamented with sparse whorls of short setæ. Ovipositor short, conical; venation as in *Porricondyla*. Separated from the three preceding genera by the triarticulate palpi. Africa.

Genus LOPESIA Tav. 1908, type *L. parinarii* Tav.

Venation as in *Porricondyla*. Antennal segments 14, binodose, easily recognized by the long loops of the circumfili like those in the Itonidiniaræ. South America.

Genus ALLODIPLOSI Kieff. & Jörg. 1910, type *A. crassus*
Kieff. & Jörg.

Antennal segments 14, binodose, the circumfili scarcely reaching the following node, easily separated from the preceding by the uniaarticulate palpi. South America.

Genus HOLONEURUS Kieff. 1894, type *Holoneura cincta* Kieff.

Venation as in *Porricondyla* except that the fifth vein is simple, the sixth wanting. Antennal segments 12 to over 20. Synonym: *Holoneura* Kieff. Europe, North America.

Tribe LASIOPTERARIÆ.

Members of this and the following tribes have no distinct cross-vein uniting the third vein with subcosta. In this tribe costa is thickly scaled and the third vein usually very close to the anterior margin of the wing. Antennal segments sessile, cylindric, not produced. Claws almost invariably toothed. Comprises a large number of usually brown and white marked species living for the most part in stem galls on woody or herbaceous plants or in the peculiar leaf blister galls.

Genus **STEFANIELLA** Kieff. 1897, type *S. atriplicis* Kieff.

Subcosta and third vein very near costa; the third and fourth antennal segments not coalescing, separated by at least a rudimentary constriction. Palpi biarticulate, the claws toothed or simple. Europe.

Genus **APLONYX** Perez 1908, type *A. chenopodii* Perez.

Separated from the preceding genus by the uniarticulate palpi and from the following genus by the mouth-parts not being produced and the simple claws. Europe.

Genus **BALDRATIA** Kieff. 1897, type *B. salicornia* Kieff.

Allied to the two preceding genera though easily separated therefrom by the uniarticulate palpi and the distinctly produced mouth-parts. Europe.

Genus **LASIOPTERA** Meign. 1818, type *Cecidomyia albipennis* Meign.

Venation as in the preceding genera, the third and fourth antennal segments coalescing or closely fused, the pulvilli well developed; palpi tri- or quadriarticulate; three long veins, the fifth forked some distance from its base. Synonym: *Diomyza* Westw. Europe, Africa, North and South America, Australia.

Genus **NEOLASIOPTERA** Felt 1908, type *Lasioptera vitinea* Felt.

Separated from the preceding genus by the four simple, long veins, the sixth arising from the base of the wing. North America.

Genus **MEUNIERIELLA** Kieff. 1905, type *M. dalechampia* Rübs.

This genus appears to be closely related to, if not identical with *Lasioptera* Meign. Synonym: *Meuneria* Rübs., not Kieffer. South America.

Genus **ASTEROMYIA** Felt 1910, type *Lasioptera carbonifera* Felt.

Venational and antennal characters similar to those of *Lasioptera*. Separated therefrom by the uni- or biarticulate palpi. North America.

Genus **CLINORHYNCHA** H. Lw. 1850, type *Lasioptera chrysanthemi* H. Lw.

Venation nearly as in *Lasioptera*; antennal segments 10-13, easily recognized by the greatly produced mouth-parts and the prolonged thorax. Europe, North America.

Genus **ACORHYNCHUS** Rond. 1846, type *A. longicollis* Rond.

This genus possesses all the characters of the preceding except

that the fifth vein has been described as simple. *Clinorhyncha* H. Lw. is probably a synonym. Europe.

Genus **CAMPTONEUROMYIA** Felt 1908, type *Dasyneura virginica* Felt.

The third vein widely separated from costa and strongly arched, it and the body not very thickly clothed with scales; antennal segments sessile in both sexes. North America.

Genus **TROTTERIA** Kieff. 1892, type *Lasioptera obtusa* H. Lw.

Third vein widely separated from costa, it and the body thickly clothed with shining scales; easily distinguished from other members of the tribe by the produced first antennal segment, the latter with a length about three times its diameter. Synonym: *Choristoneura* Rübs. 1892, preoccupied. Europe, North America.

Tribe *DASYNEURIARIÆ*.

A large group, the members being easily separated from the preceding tribe by the almost uniform absence of scales on costa and the third vein always well separated therefrom. The antennæ are cylindric, never binodose in the male, while the claws are invariably toothed; antennal segments from 12 to over 20; palpi uni- to quadri-articulate. Many of the species produce stem or bud galls.

Genus **RHABDOPHAGA** Westw. 1847, type *Cecidomyia viminalis* Westw.

Usually large forms with 14 or more antennal segments, the flagellate ones of the male stemmed. Separated from the following genus by the third vein being straight, usually tapering distally and uniting with costa very near or at the wing apex. Synonyms: *Dichelomyia* Rübs. 1892, in part; *Bertieria* Kieff. 1896, in part. Europe, North America.

Genus **DASYNEURA** Rond. 1846, type *D. luteofusca* Rond.

Distinguished from the preceding by the third vein being straight or curved anteriorly, tapering but little distally and uniting with costa distinctly before the apex of the wing. The wings are hyaline, the membrane not scaled, the female ovipositor long, sometimes longer than the body and the circumfili not greatly produced. Synonyms: *Perrisia* Rond. 1846; *Dichelomyia* Rübs. 1892, in part; *Bertieria* Kieff. 1896, in part, and *Ncoccrata* Coq. 1900. Europe, North America, Australia.

Genus **LASIOPTERYX** Westw. 1840, type *L. obfuscata* Meign.

Wings fuscous, the membrane scaled, the female ovipositor short, the circumfli strongly produced in the male much as in *Bremia*. Synonyms: *Diomyza* Shin. 1864; *Lepidomyia* Kieff. 1894; *Lcdomyia* Kieff. 1895. Europe, North America.

Genus **ARNOLDIA** Kieff. 1895, type *Cecidomyia quercus* Binn.

Antennal segments 12 to 13, sessile; palpi quadriarticulate. Separated from the following genus by the sessile antennal segments and nearly straight third vein uniting with costa near the apex. Synonym: *Jancitia* Kieff. 1896. Europe.

Genus **NEUROMYIA**, new genus, type *Arnoldia minor* Felt.

Antennal segments 11 or 12, the fifth of the male with a stem three fourths the length of the cylindric basal enlargement. Distinguished from the preceding genus by the third vein being strongly curved and uniting with costa at the distal fourth and the stemmed antennal segments in the male. North America.

Genus **MACROLABIS** Kieff. 1892, type *Cecidomyia pilosellæ* Binn.

Antennal segments 11 to 12, rarely 13-14, sessile or subsessile; palpi quinquearticulate; ovipositor as long as the body. Separated from the two preceding genera by the very stout basal clasp segment of the male. Europe.

Genus **DRYOMYIA** Kieff. 1897, type *D. circinans* Giraud.

Wing venation nearly as in the three preceding genera. Antennal segments 18-20; palpi triarticulate. Europe, North America.

Genus **CYSTIPHORA** Kieff. 1892, type *C. pilosellæ* Kieff.

Antennæ with 13 or 14 antennal segments, the fifth of the male with a stem as long as the cylindric basal enlargement. Female antennal segments sessile or subsessile; palpi triarticulate; ovipositor basally stout, retractile, the distal portion chitinated, broad basally, acute apically. Europe, North America.

Genus **RHIZOMYIA** Kieff. 1897, type *R. perplexa* Kieff.

Antennal segments 12, the fifth of the male with a stem as long as the cylindric basal enlargement, those of the female subsessile; palpi triarticulate; terminal clasp segment of the male very long, slender, the ovipositor short, lobed. Synonym: *Coccomorpha* Rübs. 1899. Europe, North America.

Genus DIARTHROMYIA Felt 1908, type *D. artemisia* Felt.

Antennal segments 18, the flagellate ones stemmed in both sexes; palpi biarticulate; claws minutely unidentate. Separated from the preceding genera by the greatly reduced palpi and from the following genus by the more numerous antennal segments. North America.

Genus COCCIDOMYIA, new genus, type *C. pennsylvanica*, new species.*

Male.—Length, 1.25 mm. Antennæ with 12 segments, the third and fourth fused, the fifth with a stem three fourths the length of the subcylindric basal enlargement. Palpi: first segment short, stout, the second a little longer, narrowly oval. Mesonotum dark brown. Scutellum and post-scutellum fuscous yellowish. Abdomen dark brown, rather thickly setose. Genitalia fuscous yellowish. Wings: subcosta uniting with costa at the basal third, the third vein just before the apex; the fifth indistinct distally, forks near its apex and joins the posterior margin just beyond the basal half, its branch near the basal third. Halteres and legs probably fuscous yellowish; claws unidentate.

Female.—Length, 1.5 mm. Antennal segments 12, the fifth with a stem one third the length of the subcylindric basal enlargement. Palpi biarticulate. Mesonotum dark brown. Scutellum and post-scutellum fuscous yellowish. Abdomen reddish brown, sparsely setose; ovipositor short.

Reared from young *Lecanium* scales.

Type Cécid 938, N. Y. State Museum.

Antennal segments 12, the flagellate ones in both sexes stemmed; palpal segments biarticulate, the third vein uniting with costa at or very near the apex. North America.

Genus GUAREPHILA Tav. 1909, type *G. albida* Tav.

Allied to *Diarthromyia* Felt, from which it is separated by the uniarticulate palps and the trifid claws. Antennal segments 17 or 18, the flagellate ones subsessile. Africa.

Tribe OLIGOTROPHIARÆ.

The third vein in this tribe is well separated from the anterior margin, the antennal segments are short, cylindric, usually stemmed in the male and the claws are simple, this latter serving to differentiate the species from the preceding tribe.

Genus PHYTOPHAGA Rond. 1840, type *Cecidomyia destructor* Say.

Antennal segments 12 to over 20, the flagellate ones stemmed in the male, usually sessile in the female; palpi quadriarticulate. Distinguished from the following by the third vein uniting with costa at the apex of the wing. Synonyms: *Mayetia* Kieff. 1896, *Mayetiola* Kieff. 1896, *Poomyia* Rübs. 1910. Europe, North America.

* *Coccidomyia pennsylvanica*, new species.

Genus MIKIOLA Kieff. 1896, type *Cecidomyia fagi* Hart.

Antennal segments 22 to 24, the flagellate ones stemmed in the male, subsessile in the female; palpi quadriarticulate. Venation similar to that of *Phytophaga rigida*, closely related to, if not identical with *Phytophaga*. Europe.

Genus JANETIELLA Kieff. 1897, type *J. thymi* Kieff.

The third vein unites with costa well before the apex of the wing, a character separating it from the preceding genus. Antennal segments 12 to 16, the flagellate ones stemmed in the male, subsessile in the female; palpi quadriarticulate. Europe, North America, South America.

Genus OLIGOTROPHUS Latr. 1805, type *Tipula juniperina* Linn.

A large form with 20 antennal segments, the flagellate ones stemmed in the male, sessile in the female; palpi probably quadriarticulate, though Kieffer states that these organs are triarticulate, a condition true of the American forms provisionally referred to this genus. Specimens of this type species in the British Museum, identified by Winnertz, have the general appearance of *Phytophaga rigida*. Europe, North America, South America.

Genus LYCIOMYIA Kieff. & Jörg. 1910, type *L. gracilis* Kieff. & Jörg.

Antennae of female with 17 segments, remarkable because of the five or six slightly looped circumfili on the flagellate segments, the fifth cylindric, with a length about $2\frac{1}{2}$ times its diameter and with a short stem. Palpi triarticulate. South America.

Genus ULEIA Rübs. 1905, type *U. clusia* Rübs.

Antennal segments 22 to 25, the flagellate ones with a short stem. Closely related to the preceding genera and separated therefrom by the bi- or triarticulate palpi and the thickly scaled legs. South America.

Genus RHOPALOMYIA Rübs. 1892, type *Oligotrophus tanaceticola* Karsch.

Antennal segments 12 to over 20, the flagellate ones stemmed in the male, usually subsessile in the female; palpi uni- or biarticulate; terminal clasp segment of the male short, stout, fusiform; ovipositor of the female fleshy, at least moderately long, not enlarged; terminal lobes rather short and stout. Europe, North America, South America.

Genus PSECTROSEMA Kieff. 1904, type *P. tamaricis* D. Stef.

With the characters of *Rhopalomyia* except that the lateral lobes of the pulvilli are longer than the median one. Europe.

Genus SACKENOMYIA Felt 1908, type *Oligotrophus acerifolius* Felt.

Antennal segments 12 to over 20, the flagellate ones subsessile or sessile; palpi biarticulate. Distinguished from allied forms by the short ovipositor of the female, the terminal portion chitinous, cultri-form. North America.

Genus WALSHOMYIA Felt 1908, type *W. juniperina* Felt.

Antennal segments 18 or 19, the flagellate ones of the male stemmed; palpi uniarticulate; ovipositor of the female short, triangular, the terminal clasp segment of the male distinctly produced, not fusiform. North America.

Tribe ASPHONDYLIARÆ.

Large, mostly heavy bodied insects with long, cylindric, sessile antennal segments, the latter without whorls of long hairs; claws simple. One group of genera is peculiar for the most part because of the great reduction in the palpal segments and the highly specialized, aciculate ovipositor. The other group shows no reduction in the palpi but a high degree of specialization in the circumfli and relatively small modification of the ovipositor. The species live mostly in bud or leaf galls.

Genus ZALEPIDOTA Rübs. 1908, type *Z. piperis* Rübs.

Palpi uniarticulate, legs and wings thickly scaled; the third vein unites with costa at the apex of the wing, the subcostal cell being remarkably broad and with a rudimentary vein spur at its base. South America.

Genus BRUGGMANNIELLA Tav. 1909, type *B. braziliensis* Tav.

The subcostal cell is opaque, not remarkably broad and there is no rudimentary vein spur at its base. The basal portion of the ovipositor is dilated apically. South America.

Genus ASPHONDYLIA H. Lw. 1850, type *Cecidomyia sarothamni* H. Lw.

Antennal segments 14, the flagellate sessile, cylindric, the distal ones in the female reduced; palpi uni- to triarticulate; subcostal cell not opaque; terminal clasp segment of the male genitalia bidentate;

ovipositor of the female with the distal portion aciculate. Synonyms: *Phyllophaga* Rond. 1856; *Cylindrocera* Lioy 1863. Europe, Africa, North America, South America, Australia.

Genus DAPHNEPHILA Kieff. 1905, type *D. haasi* Kieff.

Fourteen antennal segments as in *Asphondylia*, those of the male successively shorter distally, the apical segment in the female greatly reduced; palpi tri- or quadriarticulate; terminal clasp segment of male bidentate; ovipositor of the female short, thick, composed of two conic, apposed plates, apparently intermediate in structure between *Asphondylia* and *Schizomyia*. Asia.

Genus ACROËCTASIS Rübs. 1910, type *A. maura* Rübs.

Separated from the preceding genera by the third vein uniting with costa at the distal fourth; antennal segments 12, the flagellate ones cylindric, with relatively high circumfili; palpi triarticulate. Europe.

Genus SCHIZOMYIA Kieff. 1889, type *S. galiorum* Kieff.

Antennal segments 14, sessile or subsessile, the flagellate ones in the male with remarkably stout and elevated circumfili; palpi quadriarticulate, the basal clasp segment lobed distally; antennal segments in the female much as in *Asphondylia*, the apical portion of the ovipositor aciculate. Synonym: *Kiefferia* Mik 1895. Europe, North America, Africa.

Genus POLYSTEPHA Kieff. 1897, type *P. quercus* Kieff.

Antennal segments 14, subsessile, cylindric, the flagellate ones with numerous tortuous, transverse, low circumfili; palpi quadriarticulate; terminal clasp segment of the male with a chitinous spur and a series of small spines. Europe.

Genus CINCTICORNIA Felt 1908, type *Asphondylia transversa* Felt.

Closely allied to the preceding, the male being distinguished therefrom by the transversely and evenly serrate spur of the terminal clasp segment and the low, regular circumfili. Female with 14 antennal segments, the flagellate ones with two to six transverse, anastomosing circumfili; ovipositor stout and tapering to subacute, minute lobes. North America.

Genus ULEELLA Rübs. 1908, type *U. dalbergiae* Rübs.

Erected for an Itonidid larva with a remarkable tail-like, elongate

anal segment and a circular, oval or angulate anal orifice with its long axis transverse or at right angles to the median line; ventral surface with disk-shaped pads or folds. South America.

Tribe *ITONIDINARIÆ*.

The more characteristic members of this tribe are easily distinguished by the long, thickly haired antennæ with 14, rarely 12 or more segments, the flagellate segments of the male usually binodose and with two or three circumfili, the latter usually with greatly produced loops; palpi uni- to quadriarticulate; claws simple or toothed. A very large tribe, including many diverse forms.

Group *BIFILI*.

This group is easily recognized by the presence of but two circumfili on the flagellate antennal segments of the male, the nodes being equal or nearly so.

Genus AMETRODIPLOSIS Rübs. 1910, type *Clinodiplosis thalictricola* Rübs.

Separated from all other genera in the bifili group by the proximal antennal segments of the male being binodose, the distal segments with but one node. Europe.

Genus LOBOPTEROMYIA Felt 1908, type *Contarinia flicis* Felt.

Antennal segments 14, the basal portion of the stem on the flagellate segments of the male rarely with a length equal to its diameter; palpi quadriarticulate, easily recognized by the wings with the posterior area greatly produced and broadly rounded. North America.

Genus EROSOMYIA, new genus, type *E. mangiferæ*, new species.*

Male.—Length, 0.8 mm. Antennæ about twice the length of the body, thickly haired, light yellowish brown; 14 segments, the fifth having the basal portion of the stem with a length about three fourths its diameter, the distal part with a length three and one half times its diameter, the enlargements subglobose, each with a sparse subbasal whorl of setæ and a well developed subapical circumfilum, the loops of the latter extending nearly to the middle of the following enlargement; terminal segment with the distal enlargement ovate and apically with a short, stout, tapering process. Palpi: first segment irregularly subquadrate, the second a little longer, stouter, the third one half longer than the second, more slender, the fourth a little longer and more slender than the third. Mesonotum reddish brown, the yellowish submedian lines sparsely haired. Scutellum and post-scutellum yellowish. Abdomen a nearly uniform yellowish. Wings hyaline, broad, the anal angle somewhat produced. Costa

* *Erosomyia mangiferæ*, new species.

light brown, the stout third vein uniting with the margin just beyond the apex, the fifth vein forked. Halteres yellowish transparent. Legs mostly a yellowish straw, the tarsi somewhat darker; claws slender, strongly curved, with a long tooth basally; pulvilli small, about one third the length of the claws. Genitalia: basal clasp segment slender, strongly curved, obtusely lobed basally; terminal clasp segment rather stout, tapering; dorsal plate broad, broadly and roundly emarginate; ventral plate rather long, broad, broadly emarginate, both sparsely setose; style long, slender, tapering.

Female.—Length, 1 mm. Antennae nearly as long as the body, sparsely haired, dark brown; 14 segments, the fifth with a stem one third the length of the cylindric basal enlargement, which latter has a length about twice its diameter and sparse subbasal and subapical whorls of setae; terminal segment slightly reduced, with a short, obtuse process apically; pulvilli nearly as long as the strongly toothed claws. Ovipositor stout, with a length about one half that of the abdomen, the terminal lobes broadly ovate and thickly setose. Other characters nearly as in the male.

Exuvia.—Length, 0.5 mm., stout, whitish; thoracic horns long, stout, tapering; antennal cases extending to the second abdominal segment, the wing cases to the fourth abdominal segment and the leg cases almost to the apex of the body; skin apparently smooth.

Larva.—Length, 3 mm., whitish, stout, the extremities rounded; breast-bone bidentate, the teeth large, triangular, the shaft transparent.

Reared by W. H. Pattersons, St. Vincent, W. I., from presumably blister galls on very young leaves of *Mangifera indica*.

Type Cecid a2117, N. Y. State Museum.

Allied to *Loboapteromyia* Felt by the broad wings with the somewhat produced anal angle and the short basal portion of the stem in the flagellate antennal segments of the male. Easily recognized by the distinctly toothed claws, a character rarely appearing in the group bifili. South America.

Genus THURAUIA Rübs. 1899, type *T. aquatica* Rübs.

Easily distinguished from the preceding by the long antennal stems, the basal one of the fifth antennal segment with a length three times its diameter. The wings are greatly produced, narrow, with a length at least three times the width. The female has the distal portion of the ovipositor greatly produced and chitinized. Europe.

Genus ENDAPHIS Kieff. 1896, type *E. perfidus* Kieff.

Allied to *Contarinia*, though easily separated therefrom by the narrow scales on the wing membrane and the tooth-like dorsal prolongation of the first antennal segment. Ovipositor of the female short, the lobes long, slender. Europe, North America, South America.

Genus CONTARINIA Rond. 1860, type *Tipula loti* DeG.

Separated from the preceding by the absence of scales on the wings and the lack of a dorsal tooth on the first antennal segment. Costa is interrupted at its union with the third vein. The lobes of the dorsal plate taper strongly and are subacute. The ovipositor is long and filiform. Synonyms: *Eudiplosis* Kieff. 1894; *Stictodiplosis* Kieff. 1894. Europe, Africa, North America.

Genus SYNDIPLSIS Rübs. 1910, type *S. winnertzi* Rübs.

Separated from *Contarinia* by the third antennal segment not being abnormally prolonged and the flagellate segments being successively shorter distally. The pulvilli are as long or longer than the claws. Europe.

Genus THECODIPLSIS Kieff. 1895, type *Cecidomyia brachyntera* Schw.

Separated from *Contarinia* by costa not being interrupted at its union with the third vein; the lobes of the ventral plate hardly taper and are rounded apically. The ovipositor is rather stout. Europe, North America.

Genus STEPHODIPLSIS Tav. 1908, type *S. lannea* Tav.

Distinguished at once from all other bifili by the 12 antennal segments; palpi quadriarticulate, the third vein uniting with costa well beyond the apex; dorsal and ventral plates bilobed. Ovipositor filiform, very long. Africa.

Genus DENTIFIBULA Felt 1908, type *Contarinia viburni* Felt.

Easily distinguished from the preceding genera by the triarticulate palpi and the basal clasp segment with its conspicuous triangular process apically, the terminal clasp segment being therefore subapical; claws simple, strongly curved, about as long as the pulvilli. North America.

Genus ZEUXIDIPLSIS Kieff. 1904, type *Z. giardiana* Kieff.

Palpi triarticulate, basal clasp segment with no distinct process apically; pulvilli longer than the stout, evenly curved claws, the third and fourth antennal segments nearly free, the basal and distal stems of the fifth segment with a length twice and thrice their diameters, respectively; ovipositor short. Europe.

Genus STENODIPLSIS Reut. 1895, type *S. geniculati* Reut.

Distinguished from the preceding genus by the pulvilli being

shorter than the slender claws, which latter are strongly bent at the apical fourth; basal and distal stems of the fifth antennal segment with a length one half and twice their diameters, respectively. Wings remarkably long and slender. Europe.

Genus TRICONTARINIA Kieff. 1910, type *T. ciliatipennis* Kieff.

Wings, antennae and genitalia as in Contarinia; palpi triarticulate. Location provisional. Asia.

Genus MYRICOMYIA Kieff. 1900, type *Diplosis mediterranea* F. Lw.

Separated from the four preceding genera by the biarticulate palpi; basal and distal stems of the fifth antennal segment with a length one and one half and two and one half times their diameters, respectively; claws simple, strongly curved, the pulvilli twice the length of the claws; ovipositor short. Europe.

Group TRIFILI.

This group is easily recognized by the presence of three usually well-developed circumfili on the flagellate antennal segments of the male, the nodes generally being unequal and in some extreme forms the distal enlargement is almost divided.

Genus STOMATOSEMA Kieff. 1904, type *S. nemorum* Kieff.

Antennal segments 15, the fifth with a stem one fourth the length of the cylindric basal enlargement; palpi quadriarticulate; claws unidentate, strongly curved, the pulvilli small, ovipositor short. Distinguished from other forms by the greatly produced mouth-parts, the latter with a length one half that of the head, tapering. Europe.

Genus RESSELIELLA Seitz. 1906, type *R. picce* Seitz.

Distinguished from the preceding by the mouth-parts not being produced. The lobes of the dorsal and ventral plate of the male are truncate, the ovipositor is short with one long, narrow, oval lobe. Europe.

Genus GEODIPLOSIS Kieff. 1909, type *G. ranunculi* Kieff.

Separated from the American species provisionally referred to *Dicrodiplosis* Kieff. by the triangular lobes of the dorsal plate and the linear parallel lobes of the ventral plate. The ovipositor is rather short. Europe.

Genus CALODIPLOSIS Tav. 1908, type *C. parinari* Tav.

Allied to *Dicrodiplosis* Kieff. and separated from *Gcodiplosis*

Kieff. by the lobes of the ventral plate being short and broadly rounded; the ovipositor is short, the pulvilli about half the length of the claws. Africa.

Genus YOUNGOMYIA Felt 1908, type *Dicrodiplosis podophyllæ* Felt.

Readily separated from the four preceding and the three following genera by the slender terminal clasp segment being distinctly longer than the basal clasp segment. The flagellate antennal segments of the male are trinodose, the dorsal plate is almost divided and the ventral plate roundly truncate. North America.

Genus DICRODIPLOSIS Kieff. 1895, type *D. fasciata* Kieff.

The type species has the ovipositor short, the lobes with the margin pectinate. The American species provisionally referred to this genus have the ventral plate usually long. Europe, North America.

Genus DICHODIPLOSIS Rübs. 1910, type *D. langeni* Rübs.

Distinguished from the preceding by the greatly produced ovipositor; ventral plate narrow, not elongate, rounded apically, the claws bent at nearly right angles, the tooth scarcely noticeable and nearly parallel with the main part of the claw. Europe.

Genus THOMASIA Rübs. 1910, type *Clinodiplosis oculiperda* Rübs.

Separated from the preceding genus by the deeply emarginate, not prolonged ventral plate, the tooth of the claws strong and erect. Europe.

Genus BREMIA Rond. 1860, type *Diplosis decorata* H. Lw.

Distinguished from the preceding genera by the anterior claws being toothed, the posterior simple and easily separated from most of the other Itonidinaræ by the greatly produced setæ and loops of the circumfili on the ventral portion of the flagellate antennal segments. Easily separated from the following genus by the rudimentary middle circumfilum, the flagellate segments apparently with but two circumfili. Europe, North America.

Genus APHIDOLETES Kieff. 1904, type *A. abietis* Kieff. by present designation.

Easily distinguished from the preceding form by the three well-developed circumfili on the flagellate antennal segments of the male. Europe, North America, Australia.

Genus LOBODIPLOSIS Felt 1908, type *Mycodiplosis acerina* Felt.

Antennal segments 14, the flagellate more or less trinodose, the circumfili and setæ nearly equal. Palpi quadriarticulate; basal clasp segment with a distinct lobe apically, the terminal clasp segment therefore subapical. North America.

Genus ANTICHIRA Rübs. 1910, type *A. striata* Rübs.

Allied to the preceding genus, the basal clasp segment with a large, hyaline lobe at the internal apical angle. Europe.

Genus COQUILLETOMYIA Felt 1908, type *Mycodiplosis lobata* Felt.

Distinguished from the two preceding genera by the setose basal lobe on the basal clasp segment and remarkable because of the strongly chitinized ventral plate or harpes. North America.

Genus FELTIELLA Rübs. 1910, type *F. tetranychii* Rübs.

Allied to the preceding and presumably separable therefrom by the ventral plate and harpes being as in *Lestodiplosis* Kieff. Europe.

Genus KARSCHOMYIA Felt 1908, type *Mycodiplosis viburni* Felt.

Separated from the four preceding genera by the absence of a distinct lobe on the basal clasp segment; flagellate antennal segments of the male trinodose; terminal clasp segment subfusiform, greatly dilated and much shorter than the basal clasp segment. North America.

Genus MYCODIPLOSIS Rübs. 1895, type *Diplosis coniofaga* Winn.

Antennal segments 14, binodose; palpi quadriarticulate; terminal clasp segment not abnormally produced or subfusiform; ventral plate not produced, the lobes of the dorsal plate not divided, cleft or triangularly emarginate; ovipositor short. Europe, North America.

Genus CLINODIPLOSIS Kieff.* 1894, type *Diplosis cilicrus* Kieff.

Placed here by Rübsaamen on account of the dentate anterior claws. Separated from *Mycodiplosis* by the greatly elongate, emarginate ventral plate. The dorsal plate is deeply cleft and triangularly emarginate. Europe.

Genus DIADIPLOSIS new genus, type *D. coccii* new species.

The unidentate anterior claws and binodose antennæ of the male, with the three circumfili show a relation, to *Mycodiplosis* Rübs. and its allies from which it is easily separated by the triarticulate palpi.

* Species previously referred to this genus belong to the recently erected *Parallelodiplosis* Rübs.

Diadiplosis cocci, new species.

Male.—Length 1 mm. Antennæ one half longer than the body, thickly haired, light brown; 14 segments, the fifth having the basal portion of the stem with a length one half greater than its diameter, the distal part with a length twice its diameter, the basal enlargement subglobose, with a sparse sub-basal whorl of stout setæ, the circumfilum with stout loops extending to the base of the distal enlargement, which latter is subcylindric, has a length one half greater than its diameter, a scattering whorl of stout setæ and basal and apical circumfili, the loops of the latter extending to the apex of the segment; terminal segment produced, the basal portion of the stem with a length three times its diameter, the distal enlargement subcylindric, with a length twice its diameter and a long, fingerlike process apically. Palpi; first segment very short subquadrate, with a length three fourths its diameter, the second quadrate, with a length one half greater than its diameter, the third slender, about twice as long as the second. Face yellow. Mesonotum dark red, the submedian lines sparsely haired. Scutellum dark red, postscutellum reddish. Abdomen dark red, the genitalia fuscous. Wings hyaline, costa dark brown, subcosta uniting therewith near the basal half, the nearly straight third vein at the apex of the wing, the fifth joining the posterior margin at the distal fourth, its branch near the basal half. Halteres reddish transparent, fuscous apically. Coxæ orange yellow; femora fuscous yellowish; tibiæ darker; tarsi nearly brown; claws stout, strongly curved basally, the anterior unidentate, the pulvilli about half the length of the claws. Genitalia: basal clasp segment short, greatly swollen, with a length about one fourth greater than its diameter; terminal clasp segment short, slender, apically with a stout claw; dorsal plate short, deeply and triangularly emarginate, the lobes tapering, broadly rounded and sparsely setose; ventral plate short, broad, broadly and roundly emarginate, sparsely setose; style short, stout, narrowly rounded apically.

Female.—Length 1 mm. Antennæ extending about to the fifth abdominal segment, sparsely haired, light brown; 14 segments, the fifth with a stem about one fourth the cylindric basal enlargement, which latter has a length two and one half times its diameter, a sparse subbasal whorl of stout setæ and a scattering subapical band of shorter, curved setæ; terminal segment slightly produced, with a length three times its diameter and a short, knob-like process apically. Palpi: first segment short, quadrate, with a length three fourths its diameter, the second narrowly oval, with a length twice its diameter, the third a little longer than the second, more slender. Color characters nearly as in the male, except that the abdomen is deep red. Ovipositor short, the terminal lobes with a length twice the diameter, broadly rounded apically and thickly setose.

Pupa.—Length 1.5 mm., stout, yellowish red, darker apically. The antennal sheaths extend to the base of the abdomen, the wing cases to the third abdominal segment, those of the legs nearly to the fifth.

Larva.—Length 1.75 mm., rather stout, pale orange, the segmentation deep. Head moderately long, broad, tapering, the antennæ slender, unarticulate, with a length fully four times their diameter; breast-bone small, the shaft short,

stout, with a length about three times its width, distinctly expanded at both extremities, the anterior having at the widely separated lateral angles an indistinct, broadly rounded tooth. Skin rather coarsely shagreened; posterior extremity narrowly rounded and broadly lobed.

Type Cecid. 22128, N. Y. State Museum.

Reared by William H. Pattersons of the Agricultural School, St. Vincent, W. I., from larvæ preying upon the eggs of *Saissetia nigra* Nietn., frequently abundant upon stems of Sea Island cotton. South America.

Genus CALAMODIPLOSIS Rübs. 1910, type *Clinodiplosis coriscii* Kieff.

Provisionally proposed because of the tubular ventral plate, assuming Kieffer's illustration to be accurate. Europe.

Genus CARYOMYIA Felt 1909, type *Cecidomyia tubicola* O. S.

Antennal segments 14, cylindric or binodose, the circumfilii with short loops. Palpi tri- or quadriarticulate. Claws simple. Male much as in *Hormomyia*. Ovipositor short, triangular, the lobes minute. North America.

Genus MASSALONGIA Kieff. 1897, type *Hormomyia rubra* Kieff.

Easily recognized by all the flagellate antennal segments in the male being cylindric, stemmed and distinguished from the preceding genus by the biarticulate palpi; ovipositor short, stout. Europe.

Genus PRODIPLOSIS Felt 1908, type *Cecidomyia floricola* Felt.

Basal antennal segments binodose, the distal, tenth to fourteenth, cylindric, stemmed; palpi quadriarticulate. North America.

Genus CENTRODIPLOSIS Kieff. & Jörg. 1910, type *C. crassipes* Kieff. & Jörg.

Distinguished from the preceding by the third antennal segment in the male being cylindric, the others binodose; ovipositor aciculate. South America.

Genus MONODIPLOSIS Rübs. 1910, type *Diplosis liebeli* Kieff.

Flagellate antennal segments uninodose, ventral plate elongate, emarginate. Europe.

Genus GEISENHEYNERIA Rübs. 1910, type *G. rhenana* Rübs.

Separated from the preceding by the ventral plate being scarcely longer than the dorsal plate, not much narrowed, deeply incised apically. Europe.

Genus ARTHROCNOX Rübs. 1895, type *A. vitis* Rübs.

Antennal segments 14, the flagellate binodose; palpi quadriarticulate; ovipositor short, easily recognized by the third vein uniting with costa well before the apex. Europe, North America.

Genus MICRODIPLOSIS Tav. 1908, type *M. zambezensis* Tav.

Venation nearly as in the preceding genus except for the simple fifth vein; flagellate antennal segments binodose; palpi quadriarticulate; ventral plate rather long, greatly expanded subapically, broadly and roundly emarginate; ovipositor short. Africa.

Genus HORMOMYIA H. Lw. 1850, type *Cecidomyia crassipes* H. Lw.

Antennal segments 14 to over 20, the flagellate, binodose in the male, the circumfili with short loops. Palpi uni- to triarticulate. Large species, easily recognized by the mesonotum being greatly produced over the head. Europe, North America.

Genus PUTONIELLA Kieff. 1896, type *Diplosis marsupialis* F. Lw.

Flagellate antennal segments of the male nearly trinodose; circumfili only moderately developed; palpi triarticulate, the pulvilli one fourth longer than the simple claws; ovipositor short, broadly rounded. Europe.

Genus ATRICHOSEMA Kieff. 1904, type *A. aceris* Kieff.

Antennal segments 14, the flagellate subsessile; palpi triarticulate; ovipositor short; pulvilli longer than the claws. Provisionally associated with the preceding. Europe.

Genus PSEUDHORMOMYIA Kieff. 1897, type *P. granifex* Kieff.

Separated from *Hormomyia* by the mesonotum not being produced over the head. Antennæ in the male characteristic of the typical *Hormomyia*. Flagellate antennal segments of the female with three well developed circumfili; palpi tri- or possibly quadriarticulate; ovipositor long. Europe.

Genus AMAUROSIPHON Rübs. 1910.

Erected without a description or reference thereto of a species and separated from the preceding genus by the terminal clasp segment of the male being thickened, club-shaped and the third and fourth antennal segments fused. It may be cogenetic with the preceding. Europe.

Genus LOEWIOLA Kieff. 1896, type *Diplosis centaureæ* F. Lw.

Separated from the two preceding genera by the ventral plate, which is as long as the dorsal plate, being deeply bilobed and the ovipositor not longer than the body. The circumfili are slightly produced, the palpi triarticulate, the terminal segment being greatly produced; pulvilli rudimentary. Europe.

Genus HAPLODIPLOSIS Rübs. 1910, type *Diplosis equestris* Wagn.

Separated from the preceding genus by the ventral plate being narrowly truncate, not emarginate. Europe.

Genus MONARTHROPALPUS Rübs. 1892, type *Diplosis buxi* Lab.

The binodose antennal segments have short, stout circumfili similar to those of *Hormomyia*; the flagellate antennal segments of the female with two rather high circumfili; palpi unarticulate, the pulvilli not longer than the claws, the ovipositor terminating in a long, stout, chitinous spine. Europe, North America.

Genus FRAUENFELDIELLA Rübs. 1905, type *F. coussapoæ* Rübs.

Separated from the preceding genus by the ovipositor having two large dorsal lobes apically, the female antennal segments with "worm-like" loops as in *Asphondylia* (presumably like those of the male); palpi unarticulate. South America.

Genus BRAUERIELLA Kieff. 1896, type *Diplosis phillyreæ* F. Lw.

Apparently closely related to *Hormomyia*, since the circumfili are nearly equally developed in both sexes; second node of the fifth antennal segment in the male with a length two and one half times its diameter; palpi biarticulate; pulvilli longer than the claws, ovipositor short, lobed. Europe.

Genus DICHRONA Rübs. 1899, type *D. gallarum* Rübs.

Separated from the preceding genus by the second node of the fifth antennal segment in the male having a length one and three fourths times its diameter, the pulvilli being nearly as long as the claws. Probably cogenetic with the preceding. Europe.

Genus ORSEOLIA Kieff. and C. Massl. 1902, type *O. cynodontis* Kieff. and C. Massl.

Distinguished from the two preceding genera by the fifth antennal segment of the female having circumfili less developed, while those in the male are more strongly developed; palpi biarticulate or quad-

riarticulate, the distal segment greatly produced or strongly constricted. Europe, Asia.

Genus HYPERDIPLOSIS Felt 1908, type *Cccidomyia lobata* Felt.

Antennæ binodose, the circumfili with short, very indistinct loops; palpi quadriarticulate, the claws bent at right angles or nearly so; ventral plate long, deeply and roundly emarginate, the dorsal plate dilated and with strongly produced angles. North America.

Genus GIARDOMYIA Felt 1908, type *Cccidomyia photophila* Felt.

The binodose antennal segments of the male with distinct circumfili, the loops extending to the apex of the segment; the claws bent almost at right angles and usually somewhat enlarged subapically; ventral plate very long, slender, roundly emarginate, the dorsal plate not greatly enlarged. North America.

Genus OCTODIPLOSIS Giard 1894, type *Diplosis glyceriæ* Rübs.

Distinguished from the preceding by the ventral plate being rather short, deeply and triangularly incised, the dorsal plate broad, deeply and broadly incised. Europe.

Genus ISODIPLOSIS Rübs. 1910, type *I. involuta* Rübs.

Separated from the preceding genera by the ventral plate being deeply cleft and the thin, smooth terminal clasp segment. Europe.

Genus METADIPLOSIS Felt 1908, type *M. spinosa* Felt.

Separated from the preceding genera by the claws not being bent at right angles and easily recognized by the short, stout basal clasp segment having a conspicuous triangular, chitinous process at the internal angle, while the terminal clasp segment is short, greatly constricted near the middle, enormously swollen and recurved apically. North America.

Genus EPIDIPLOSIS Felt 1908, type *E. sayi* Felt.

Easily separated from the preceding genus by the long, setose apical process on the basal clasp segment, strongly suggesting the genitalic structure of *Lobodiplosis* though readily distinguished therefrom by the simple claws. North America.

Genus LESTODIPLOSIS Kieff. 1894, type *L. septemguttata* Kieff.

Frail, usually yellowish species with spotted wings. Easily recognized by the triangular lobe at the internal basal angle of the basal clasp segment; the ventral plate is scarcely longer than broad. Syno-

nymy: *Leptodiplosis* Kieff.; *Coprodiplosis* Kieff. Europe, North America.

Genus PROCONTARINIA Kieff. and Cec. 1906, type *P. matciana* Kieff. and Cec.

This Indian species may be separated from the preceding genus by the basal lobe on the basal clasp segment not being well developed; the ventral plate is long, broad, broadly and roundly emarginate. Asia.

Genus PARADIPILOSIS Felt 1908, type *Cecidomyia obesa* Felt.

Distinguished from the preceding four genera by the basal clasp segment being without conspicuous lobes or spines. This structure is short, broad, while the terminal clasp segment is short, stout and apically with a broad, chitinated, serrate margin; dorsal and ventral plates short, broad, each triangularly emarginate. North America.

Genus HARMANDIA Kieff. 1896, type *Diplosis tremula* Winn.

Separated from the preceding genus by the dorsal and ventral plates being deeply and roundly emarginate; the ovipositor is apparently short. Europe.

Genus MACRODIPILOSIS Kieff. 1895, type *Diplosis dryobia* F. Lw.

Separated from the two preceding genera by the dorsal and ventral plates being narrowly rounded or but slightly emarginate; the terminal clasp segment is swollen basally, the apex being smooth. Kieffer states that the third and fourth antennal segments are not fused and that the pulvilli are almost as long as the claws. Europe.

Genus XYLODIPILOSIS Kieff. 1894, type *Diplosis præcox* Winn.

A synonym of *Cecidomyia nigratarsis* Zett.

The dorsal plate is triangularly emarginate and the ventral plate broadly and roundly emarginate. Separated from the following genus by the rudimentary pulvilli and the long terminal clasp segment, the latter not swollen basally. Europe.

Genus DELODIPILOSIS Tav. 1908, type *D. copaiba* Tav.

Distinguished from the preceding genus by the pulvilli being as long as the claws and the terminal clasp segment being swollen basally. Africa.

Genus BRACHYDIPILOSIS Rübs. 1910, type *B. caricum* Rübs.

The following three genera are separated from the preceding forms by the long ventral plate, which, in this genus, is emarginate. The

lobes of the dorsal plate are short, truncate, the hair whorls on the female antennæ are erect. Europe.

Genus PARALLELODIPLOSIS Rübs. 1910, type *Diplosis gallipeda* F. Lw.

The long ventral plate is narrowly rounded apically, while the basal antennal node in the male is simple, the distal double. To this genus belong forms previously referred by the writer to *Clinodiplosis* Kieff. Europe, North America, and probably South America.

Genus XENODIPLOSIS new name, type *Allodiplosis læviusculi* Rübs.

Distinguished at once from the preceding and probably from all other Itonidiniæ by the basal node of the flagellate antennal segments in the male being double, the distal simple. *Allodiplosis* Rübs., Sept., 1910, preoccupied by *Allodiplosis* Kieff. & Jörg., July, 1910.

Genus OBOLODIPLOSIS Felt 1908, type *Cecidomyia orbiculata* Felt.

The terminal clasp segment is greatly produced, being nearly one half longer than the basal clasp segment; the dorsal plate is greatly expanded, nearly divided, the lobes orbicular, while the ventral plate appears to be widely separated, the two lobes being short, stout and roundly triangular. North America.

Genus ITONIDA Meign. 1800, type *Tipula pini* DeG.

Antennal segments 14; three distinct circumfili, the nodes unequal; palpi quadriarticulate, the third vein uniting with the margin well beyond the apex of the wing; the pulvilli longer than the simple claws; the dorsal and ventral plates of the male genitalia deeply bilobed; ovipositor rather long, the lobes narrowly oval. Distribution probably world-wide.

Genus ACODIPLOSIS Kieff. 1895, type *Cecidomyia inula* H. Lw.

Palpi triarticulate; pulvilli longer than the claws. Easily recognized by the second antennal segment with a distinct tooth or ventral spine. Synonym: *Arthrocerastis* Rübs. Europe.

Genus ODONTODIPLOSIS Felt 1908, type *Cecidomyia karnerensis* Felt.

Distinguished from the preceding by the pulvilli not being longer than the claws and the absence of a distinct tooth or ventral spine on the second antennal segment. Peculiar because of the somewhat conical ventral plate or harpes with serrate margins. North America.

Genus ADIPLOSIS Felt 1908, type *Cecidomyia toxicodendri* Felt.

Easily separated from the preceding genus by the ventral plate

or harpes not being serrate and as long as the dorsal plate, the basal clasp segment stout. North America.

Genus DYODIPLOSIS Rübs. 1910, type *Hormomyia arenariae* Rübs.

A large form with triarticulate palpi. Separated from the preceding genus by the ventral plate being much shorter than the dorsal plate and slightly emarginate apically; the circumfili of the female are erect and united by two commissures. Europe.

Genus COMPSODIPLOSIS Tav. 1909, type *C. luteo-albida* Tav.

Separated from the preceding genera with simple claws by the biarticulate palpi; the stem of the fifth antennal segment has a length one fourth that of the cylindric basal enlargement; pulvilli not longer than the claws, the ovipositor short, the lobes broadly oval. South America.

Genus COURTEIA Kieff. and Leeuw.-Reijn. 1910, type *C. graminis* Kieff. and Leeuw.-Reijn.

This Javanese genus is distinguished from the preceding by the stem of the antennal segment having a length two thirds that of the cylindric basal enlargement; the pulvilli are as long as the claws, the ovipositor short, the lobes with a length twice the width. Asia.

Genus CYSTODIPLOSIS Kieff. & Jörg. 1910, type *C. longipennis* Kieff. & Jörg.

Separated from the preceding forms by the uniarticulate palpi and from the evidently allied *Monarthropalpus* Rübs. by the greater development of the circumfili.

A CORRECTION.

Volume XVIII, page 207, line 4, for *CEDARIA RITARIA* read *BARNESIA RITARIA*.

JOHN A. GROSSBECK.

OTTO SEIFERT.

Mr. Otto Seifert, for many years a member of the New York Entomological Society, died at Mt. Vernon, N. Y., October 20, 1910, in his sixty-third year.

His end came suddenly, he being in his garden when he was stricken.

About ten days before he passed away he spent a happy Sunday afternoon with the writer looking over butterflies and plants and the thought of death was far from our minds.

Entomology has lost an earnest student and many of our members a sympathetic friend.

Mr. Seifert was born in Hildesheim, Hanover, Germany, February 26, 1848; he studied as chemist and druggist and came to America in February, 1871. He established himself in New York City and achieved success as a druggist. Retiring from business a few years ago he moved to Mt. Vernon, where he devoted his entire time to raising insects and flowers.

His work in the Arctiidae is especially praiseworthy, his collection* showing the thoroughness and neatness with which he worked.

The entomological articles which he wrote and published are as follows:

Contributions to the Knowledge of North American Arctiidae, Parts 1-2-3, Journal of N. Y. Ento. Soc., Vol X; Part 4, Canadian Entomologist, Vol. XXXVII.

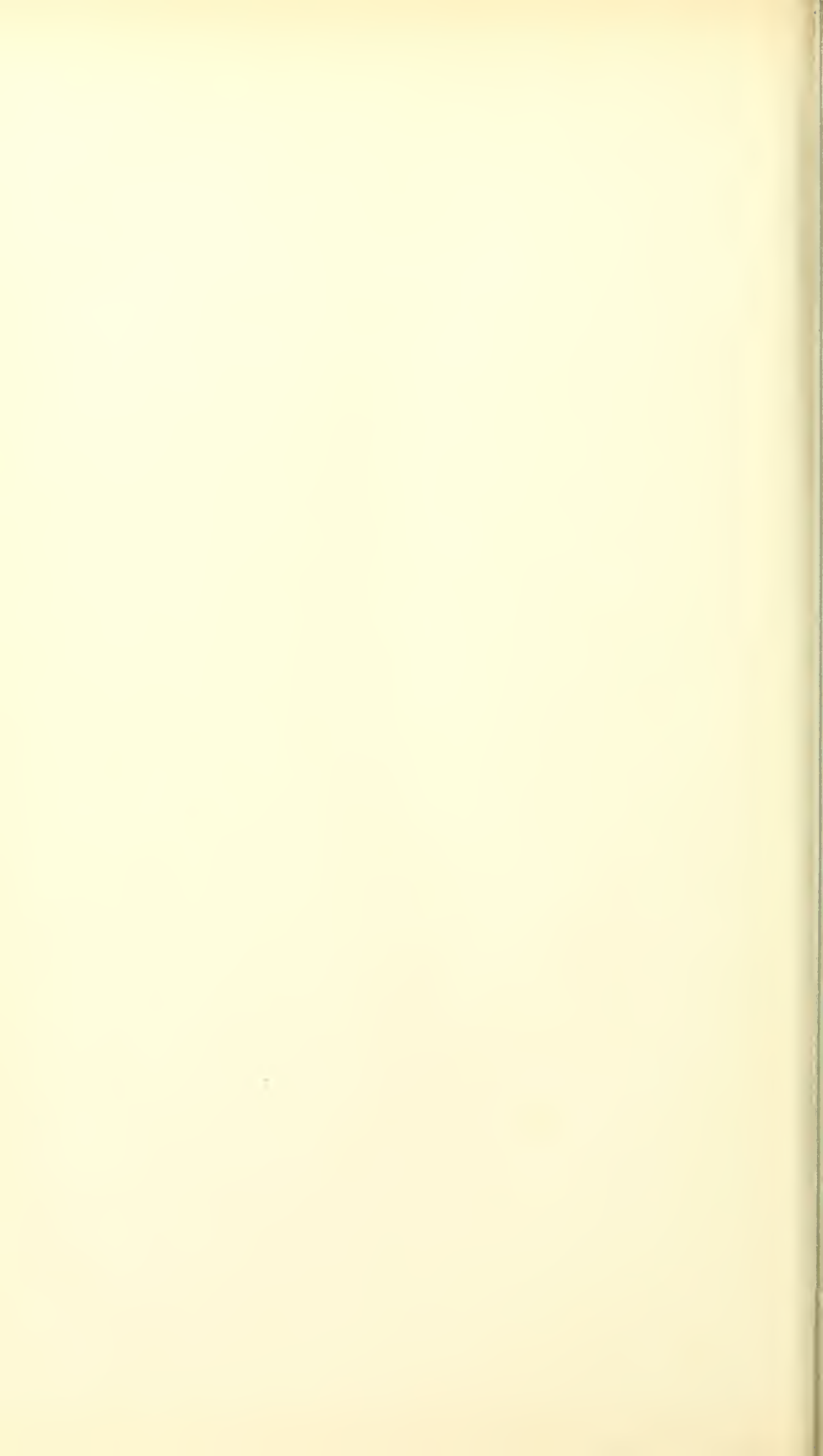
Life History of *Platysenta videns*, Journal of N. Y. Ent. Soc., Vol. IX.

Life History of *Sabulodes arcassaria*, Canadian Entomologist, Vol. XXXVI.

Parorgyia parallela Grote and its Variation, Entomologica Americana, Vol. III.

CHRISTIAN F. GROTH.

* The collection of Arctiidae has been purchased by the New York Entomological Society and presented to the American Museum.



THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

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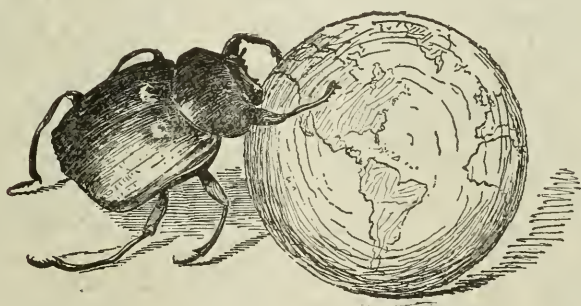
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NOTES ON PSEUDOSCORPIONS; A STUDY ON THE
VARIATIONS OF OUR COMMON SPECIES,
CHELIFER CANCROIDES LINN., WITH
SYSTEMATIC NOTES ON OTHER
SPECIES.

BY H. E. EWING,

AMES, IOWA.

(WITH PLATES I TO V.)

INTRODUCTION.

The pseudoscorpions constitute a small though well-defined group of the class Arachnida. They are typically arachnid in the possession of: first, a fused anterior portion of the body called the cephalothorax; second, in the organization of their mouth-parts; and third, in the possession of four pairs of legs. The pronounced segmentation of the abdomen, the constant possession of chelate chelicerae, the enormous development of the palpi, and the frequent absence of eyes are characters which would indicate their position among the *more* primitive members of Arachnida. On the other hand, the presence of an elaborate system of branched, tubular tracheae as well as the presence of spinning organs show that they differ essentially from the *most* primitive of the living members of the class.

The group is one that has never been very extensively studied. Prominent among the European workers might be mentioned: Menge,

who in 1855 published a rather extensive paper on the anatomy of the group, and also described and figured some of the more common forms, Simon, who in 1879 gave a description of the species then known to France, and Balzan, who in 1891 published an excellent classification of the pseudoscorpions and described many new species from various parts of the globe, but especially a large number from South America.

In North America the group has been sadly neglected and practically only two workers have made important contributions to its study. Mr. Nathan Banks has described many species from the eastern and middle states, and Mr. K. R. Coolidge has published a list of the North American species (see *Psyche*, December, 1908). Hardly any drawings have been published of our species and there appears to be some confusion in regard to the synonymy of a few of them. On this account and for the purpose of extending our knowledge of the geographical distribution of our forms, and last, though not least, in order to determine the range of variability in our commonest species, *Chelifer cancroides* Linn., this paper is written.

The writer's work is based on a large private collection, chiefly from the north central states; and upon a somewhat smaller though more representative collection in the possession of Cornell University. Though the Cornell collection is rather small, yet it contains specimens collected from many parts of the United States.

In the preparation of this paper the writer is indebted to Professor J. H. Comstock for the privilege of working up the Cornell collection, to Dr. A. D. MacGillivray also of the department of entomology for his many aids, and to Dr. Nathan Banks for comparing several named forms with the types which he possesses.

VARIATIONS IN THE HABITS OF *Chelifer cancroides* LINN.

This species varies much in its habits. In Europe it is found chiefly in houses, under wainscoting, under the dry straw and manure of chicken coops, between the loose leaves of old books, in outhouses, etc., and rather rarely under the bark of trees. Menge gives the following account of its habits:¹ "Man findet die Thiere selten in Wäldern unter Baumrinde, gewöhnlich in Häusern unter vermodern-

¹ Menge, A., Ueber die Scheerenspinnen, Chernetidæ, 1855, p. 31.

den Büchern, Kleidungsstücken, in Hühnerställen unter Strohabfällen und trockenem Koth, niemals da, wo es feucht ist." It is also reported to have similar habits by Simon, who regarded the species as probably being cosmopolitan:² "Cette espèce, répandue dans toute l'Europe, habite l'intérieur des maisons; on la trouve dans les coins obscurs, sur les boiseries, souvent dans les herbiers, même dans les boîtes de collection d'insectes; elle marche assez lentement et se cache dans les plus petites fissures. Dans ces conditions elle se trouve toujours isolément et rarement; elle a cependant été vue en nombreuse famille, par quelques observateurs, dans des ruches abandonnées, d'anciens nids de guêpes et des pigeonniers mal entretenus.—Le *C. cancroides* se trouve aussi, mais beaucoup plus rarement et accidentellement, sous des écorces d'arbres, même éloignées de toute habitation."

In this country *C. cancroides* is found most frequently under the bark of trees, rather than in the more artificial conditions surrounding the habitations of man. Under the bark of a single oak (*Quercus alba*), at Ames, Ia., I found scores of individuals. On this tree there was a regular colony of the species, and for many months I made frequent observations upon them. Just why they remained on this single tree when there were many others standing only a few feet away I could not determine. The leaves of the tree appeared to be infested with plant lice, and ants were at times constantly passing up and down the trunk to and from the lice. It may be that the pseudoscorpions fed upon the ants, but I never found any of them doing so. In our country this species is only rarely found in artificial conditions, that is, in dwelling houses, under old books, etc.

From these facts it would appear that America is the native home of this form, and not Europe, for here its conditions of life are more natural and in Europe they are more artificial. It must also be remembered that this is one of the very few of the species of this group which lives in artificial conditions. The native home of the pseudoscorpions was without doubt in the forests under bark, under logs where the ground was dry, beneath dry and matted grasses, etc. It is in these conditions that *C. cancroides* is most commonly found in this country and in these conditions some of its members are yet found no matter in what part of the world they are studied.

² Simon, E., Les Arachnides de France, VII, p. 24.

VARIATIONS IN STRUCTURE AND COLOR.—In order to study the variation in size, color and markings of this species, the following data are given in regard to the various collections obtained and examined.

Specimens Collected at Portage, Wis.—Two specimens, a male and a female, collected from under the bark of a conifer September 1, 1909, by the writer; and one male collected from a similar situation September 2, 1909.

Color: palpi very dark, hand darker than the other segments; cephalothorax dark.

Tooth-like projections present on the cephalothorax, but not present on the palpi. Movable digit of chelicerae but slightly curved; spinneret stout, straight, with five subequal barbs at its distal end.

Length: 2.8 mm.

Specimens Collected at Ames, Ia.—Many specimens, mostly collected by the writer in 1909 and 1910 in various situations. Many individuals were collected from under the bark of a single white oak (*Quercus alba*) which was badly infested with ants. Several hundred individuals were on this tree, the infestation being the most extensive I have ever observed.

Color: palpi dark, also the cephalothorax.

Cephalothorax in the case of nearly every specimen entirely without tooth-like tubercles, but in the case of a few individuals very small ones are present. They are absent from the palpi. Movable digit of chelicerae strongly curved.

Length: 2.5 mm.

Specimens Collected at Havana, Ill.—Three individuals, a male and two females, all collected from under the bark of trees standing in the shallow water of Illinois River at the point of its junction with Spoon River. The ancestors of these individuals probably were carried down to this point on drift wood from regions farther north.

Color: palpi and cephalothorax very dark, the hand darkest.

Cephalothorax without tooth-like process in the case of two individuals; one individual, a female, has some small ones on the cephalothorax. Palpi without tooth-like processes. Movable digit of chelicerae strongly curved.

Length: 2.5 mm.

Specimens Collected at Urbana, Ill.—Several specimens collected by Dr. J. W. Folsom and by the writer, mostly from under bark.

Color: in some specimens the palpi and cephalothorax are a dark chestnut brown, in others they are almost black; abdominal scuta light reddish brown.

Cephalothorax and palpi without the tooth-like processes in both the light and dark colored specimens.

Movable finger of chelicera lightly curved in the light colored specimens, but as the specimens become darker it becomes more strongly curved.

Length: 2.20 mm.

Specimens from Arcola, Ill.—Four specimens, three collected from under bark and one found in a dwelling house.

Color: general appearance a reddish brown; neither the cephalothorax nor the palpi dark.

Tooth-like tubercles only slightly indicated on the cephalothorax of one of the three bark specimens, but very pronounced on the cephalothorax and slightly indicated on the palpi of the specimen collected in the house.

Movable digit of chelicera but slightly curved. In the case of the house specimen its external margin straight. Prongs of spinneret well developed.

Length of bark specimens, 2.10 mm.; of house specimens, 3.00 mm.

Specimens Collected at Marshall, Ill.—Several specimens, all collected by the writer from under the bark of oaks.

Color: a reddish brown, darker on the cephalothorax and palpi but not very much darker.

But a very slight indication of the tooth-like processes on the cephalothorax, palpi without such indications.

Movable finger of the chelicerae but slightly curved; spinneret with very prominent prongs on its distal end.

Length: 2.10 mm.

Collections from Columbia, Mo.—An abundance of material collected by C. R. Crosby. No situations given, but the specimens were perhaps collected from various places.

Color: chestnut brown for the chitinized parts; palpi dark, but not as much so as they are in the Iowa and Wisconsin specimens.

Tooth-like tubercles absent from palpi, but indicated on the cephalothorax.

Movable fingers of chelicerae slightly curved.

Length: 2.38 mm.

Collections at Ithaca, N. Y.—Includes four specimens in the University collection. They appear to show variations among themselves.

Color: almost a uniform chestnut brown; abdominal scuta darker than usual.

Cephalothorax in all the specimens with rather prominent tooth-like tubercles, which in one individual extended to the trochanters and slightly upon the femora of the palpi.

Movable digit of the chelicerae but slightly curved.

Length: 2.50 mm.

Specimens from Borodino, N. Y.—Two specimens taken from a bee-hive.

Color: a rather light chestnut brown.

Tooth-like tubercles present on the cephalothorax and also indicated on the trochanters of the palpi.

Movable digit of the chelicerae almost straight on the outer side.

Specimens Collected at Otto, N. Y.—This collection includes a great amount of material taken from under a barn floor by Professor Comstock.

Color a light reddish chestnut brown, palpi but little darker than the body.

Tooth-like tubercles very prominent and reaching their greatest development. They are present on the cephalothorax of all the specimens and are also present to some extent upon the palpi, especially the trochanters, each of which has two prominent teeth on the posterior margin.

Movable digits of chelicerae with external margins almost straight; spinneret with moderate prongs.

Length: 3 mm.

Specimens Collected at Xenia, O.—This collection includes three specimens taken from under bark of white oak, one under bark of elm, and one each under the bark of wild cherry and black walnut.

Color: rather dark reddish brown. In one or two specimens the palpi are darkened in the region of the hand.

Tooth-like tubercles only slightly indicated, and that on the cephalothorax of one of the specimens from the oak, and on the one specimen from wild cherry.

Movable digit but slightly curved; spinneret with prominent prongs.

Length: 2.30 mm.

Chelifer muricatus from Austin, Tex.—Two specimens collected by Professor Comstock in the spring of '03.

These specimens certainly represent varieties of *C. cancroides* Linn. Hagen was strongly of this opinion, and my examination of these forms from Texas indicates clearly that they are transitional between our commonest type of *C. cancroides* Linn. and *C. scabriculus* Simon from California, the latter which must also be regarded as a variety of *C. cancroides*.

Color: reddish brown, head very dark. Tooth-like tubercles only indicated.

Movable digits of chelicerae slightly curved. Prongs of spinneret almost wanting.

A Specimen from New Mexico.—This was collected by E. J. Osler at Albuquerque, N. M., on Sept. 10, 1903. No situation given. It may be regarded as belonging to the variety *muricatus* Say.

Color: cephalothorax dark; palpi a dark reddish brown, but lighter than the cephalothorax; abdominal scutae and legs lighter than the palpi.

Tooth-like tubercles present on the cephalothorax, but only of a medium size. They are present on the trochanters of the palpi and here are moderately well developed, but are not present on the femora.

Movable fingers of the chelicerae but slightly curved.

A California Specimen.—A single specimen from Stanford University represents Simon's *scabriculus*, but is to be regarded as only a variety of *C. cancroides*.

Color: cephalothorax and palpi of a medium reddish brown.

Pedipalps stout; fingers short, not longer than the somewhat stout hand.

Tooth-like tubercles only slightly indicated on the cephalothorax and the trochanters of the palpi.

Movable digit of the chelicera rather strongly curved, but not so much so as in the case of the Iowa specimens.

Length: 2.60 mm.

Careful analysis of the preceding data shows that the following variations of *C. cancroides* exist.

1. In size the individuals range from the minimum length of 2.10 mm. to the maximum length of 3.00 mm.
2. In color we have variations from forms with very dark, almost black pedipalps and cephalothorax, to those with light yellowish brown pedipalps and cephalothorax.
3. The shape of the movable digit of the chelicera varies from a rather short, markedly curved form to one much longer and with the external margin almost straight.
4. There is a great variation in the size and number of the tubercles found on the dorsal surface of the cephalothorax and on the basal segments of the pedipalps. In the females of some collections these are practically absent, but in the well developed males of other collections they may number a score or more and are quite prominent (see Pl. II, Figs. 2, 3).
5. The lateral, posteriorly directed spurs of the abdominal scuta, found only in the case of the males vary greatly in number and size (see Pl. II, Figs. 6, 7, 8).

ADAPTATION OF VARIATIONS.

After making a careful study of the data given in these pages concerning the variations of this species, and the data collected by other writers, I have found the following adaptations of variation which may be confirmed by examining the data cited and the figures given on Plates I and II:

C. cancroides varies according to two prime factors; first, in regard to the situations in which it is found, and second, in regard to its geographical distribution.

In regard to situation the factors of nourishment and of mechanical adjustment to the conditions appear to be of great importance. Thus it is found that individuals (varieties) found under bark differ from those found in association with man and his various habitations in that they are much smaller, more flattened, have fewer and smaller tubercular processes on the cephalothorax and pedipalps, and have smaller chelicerae, with the movable digit more curved. This has, perhaps, resulted from a change in the kind of the food eaten. The size of those species found under bark is restricted greatly because they are compelled to move about in very narrow spaces, on the

other hand the forms found in dwelling houses, under barn floors, in fallen hay, etc., are not restricted as much in their movements and are much stouter.

In regard to the geographical distribution it may be stated that as a rule the northern forms are much darker than the southern, the Pacific coast variety has stouter pedipalps, with much shorter fingers (see Pl. II, Fig. 4); specimens from Texas and New Mexico are transitional between those found in California and those of the North Central States. Their pedipalps are considerably stouter than the pedipalps of the eastern forms, but not so stout as the pedipalps of the Pacific coast forms. The variety from the southwest should be called *muricatus* Say, and on the coast *scabriculus* Simon. The northern variety with the black pedipalps might be called *nigripalpus* n. var., and the forms with strongly developed tubercles on the cephalothorax and palpi, *dentatus* n. var.

THE SYNONYMY OF *Chelifer cancroides* LINN.

1761. *Chelifer cancroides* Linné. Faun. Suec., ed. XXI, 345.
1767. *Phalangium cancroides* Linné. Syst. Nat., edit. XII, p. 1028.
1778. *Chelifer europæus* De Geer. Mem. Ins., VII, p. 355, Pl. XIX, figs. 14-15.
1804. *Chelifer cancroides* Hermann. Mém. aptèr., p. 114.
1804. *Chelifer cancroides* Latreille. Hist. nat. des crust. & ins., VII, p. 141, Pl. VI, fig. 2.
1817. *Chelifer hermanni* Leach. Zool. Misc., III, p. 49, Pl. 142, fig. 3.
1821. *Chelifer muricatus* Say. Jour. Acad. Phila., II, p. 63.
1834. *Chelifer cancroides* Hahn. Arach., II, p. 52, fig. 139.
1834. *Chelifer ixoides* Hahn. Arach., II, p. 53, fig. 140.
1843. *Chelifer granulatus* Koch. Arachniden, Bd. X, p. 37, fig. 777.
1843. *Chelifer cancroides* Koch. Arachniden, Bd. X, p. 41, fig. 780.
1855. *Chelifer cancroides* Menge. Ueber die Scheerenspinnen, Chernetidæ, p. 30, Tab. IV, fig. 5.
1855. *Chelifer rhododactylus* Menge. Ueber die Scheerenspinnen, Chernetidæ, p. 32, Tab. IV, fig. 6.
1869. *Chelifer cancroides* Hagen. Rec. Amer. Ent., p. 51.
1869. *Chelifer muricatus* Hagen. Rec. Amer. Ent., p. 51.

1878. *Chelifer scabriculus* Simon. Ann. Soc. Ent. Fr., p. 154.
1879. *Chelifer cancroides* Simon. Arach. France, VII, p. 23, Pl. XVIII, fig. 2.
1891. *Chelifer degeneratus* Balzan. Ann. Soc. Ent. Fr., p. 532.
1895. *Chelifer cancroides* Banks. Jour. N. Y. Ent. Soc., III, p. 3.
1895. *Chelifer muricatus* Banks. Jour. N. Y. Ent. Soc., III, p. 3.
1895. *Chelifer scabriculus* Banks. Jour. N. Y. Ent. Soc., III, p. 4.
1899. *Chelifer cancroides* Tullgren. Ent. Tidskr., XX, p. 167, Tafl. I, fig. 1.
1908. *Chelifer cancroides* Coolidge. Psyche, December, 1908.
1908. *Chelifer scabrisculus* Coolidge. Psyche, December, 1908.

SYSTEMATIC NOTES ON VARIOUS SPECIES.

In the notes given in the following pages two new species are described, and there is also a complete description of *Chelifer cancroides*. Most of the species mentioned have never been figured before.

Chelifer cancroides Linn. (Pl. I and II, all Figs.).

Male.—General appearance a chestnut brown, but the hands, fingers and the cephalothorax darker than the rest of the body; legs slightly paler than the abdomen. Integument of the cephalothorax and first four segments of the palpi evenly tuberculate.

Chelicerae about as long as the distance between the eyes on the cephalothorax; movable digit with the outer margin almost straight; spinneret hyaline, about three times as long as broad and ending in four small cusps. Pedipalps rather long and slender; trochanter subglobose, but more projecting on the posterior side where it has a tendency to become angulate; from this point extends a rather prominent hair; femur slightly longer than the cephalothorax, constricted at its base and increasing slightly in width as you pass to the distal end; tibia almost as long and slightly wider than the femur, notched on its anterior margin at the base; hand as long as the tibia and about one and a half times as broad; fingers very slender, distinctly longer than the hand and evenly curved. The trochanter of the pedipalps is rather well clothed on its anterior surface, with short, stout almost clavate hairs; femur and tibia with fewer and more slender but similar hairs; hairs on the hand and fingers simple, and tapering, those on the fingers of two sizes, short numerous ones and about 5 very long tactile hairs on each digit.

Cephalothorax about one and a third times as long as broad; a single pair of eyes present, cornea distinct; two or three small chitinous tubercles present on each side of cephalothorax.

Abdomen considerably broader than the cephalothorax, broadest near its

middle and almost evenly rounded behind. From the posterior margin of each of the first six abdominal segments there projects backward a pair of spine-like tubercles situated near the lateral margins of the abdomen. These tubercles are the most prominent on the second and third segments. Abdominal scuta of almost equal thickness and covered with scale-like tubercles. Each scutum has a transverse row of ten, short, clavate hairs situated near its posterior margin. When the abdomen is viewed as a whole these hairs are seen to be arranged into longitudinal rows.

Legs stout; anterior pair longer than the first four segments of the pedipalps combined; last pair which is considerably the stoutest extending beyond the posterior margin of abdomen. The posterior coxæ are peculiar in possessing each a prominent, stout, curved spine on its anterior border equal in length to about one-third the width of the coxæ. Femur of leg four somewhat swollen, almost one-half as broad as long.

Length 2.25 mm.; breadth 1.20 mm.

Female.—The female differs from the male in being without the lateral, posteriorly directed spurs on the abdominal scutæ; in being without the chitinous spur on the last coxæ; and in having fewer and smaller hair-bearing, tooth-like tubercles on the cephalothorax.

This description is drawn from specimens which do not show the extremes of variation.

***Chelanops corticis*, new species** (Pl. III, Fig. 9).

Male.—A dark species. Pedipalps almost black; cephalothorax a very dark brown; abdominal scuta dark.

Chelicerae about two-thirds as long as the trochanters of the pedipalps; movable digit much stouter and also longer than the fixed one; spinneret rather large, about two-thirds as long as the finger upon which it is situated, with six spine-like processes toward its tip, the two distal of which are the largest and are curved outward. On its inner distal margin the movable digit is provided with an inwardly directed, curved claw and an anteriorly directed, straight, sharp spine about twice as long as the curved claw.

Pedipalps stout; longer than the body; trochanter subglobose and a little over one-half as long as the femur; femur with short pedicel, narrowest near its middle; external margin of femur strongly convex, internal margin concave for its distal one-half; tibia about as long as femur, but broader, swollen on its inner side and almost evenly convex on its outer side; hand as long as the fingers, the latter stout, provided with a distal claw; teeth, large and sharp. All the parts of the pedipalp except the fingers clothed with short, stout, but not clavate hairs; fingers with many short but more tapering hairs and with about six long tactile bristles. The hairs of the fingers arise from minute tubercles, and in this respect differ from those of most species of the genus.

Cephalothorax two-thirds as broad as long, with two indistinct indications of segmentation and apparently without eyes.

Abdomen twice as long as broad; last scutum undivided; all the scuta well and evenly tuberculate, and sparsely clothed with short clavate hairs, except at its tip where the hairs are a little longer and not clavate.

Legs medium in size, last pair just reaching the posterior margin of abdomen.

Length, 2.50 mm.; breadth, 1.25 mm.

Female very similar, but apparently a little smaller than the male.

Chelanops floridæ Balzan (Pl. III, Fig. 10).

Several specimens of this species are in the Cornell Collection. They were obtained by P. B. Powell from under the bark of a dead pine at Lake Lucy, Fla. This species strongly resembles *C. latus* Banks, to which I at first referred it. A specimen sent to Banks, however, was pronounced by him to be not his *latus* but *C. floridæ* Balzan. I have figured the right pedipalp.

Chelanops pallidus Banks (Pl. III, Fig. 11).

The figure given of the right pedipalp of this species is made from a specimen that agrees perfectly with one thus determined for me by Banks as his *pallidus*. This species has not been figured before.

Chelanops sanborni (Hagen) (Pl. III, Fig. 12).

Hagen's description of this species is so inadequate that the species should be entirely redescribed, but since I have only three specimens and one of these is immature, I here give only a figure of one of the pedipalps.

Obisium brunneum Hagen (Pl. III, Fig. 13).

As no figure has been published of this species one is given in this paper. This is a common species in the northern states. Banks agrees with my determination of my specimens.

Blothrus magnus, new species (Pl. IV, Fig. 14).

A very large species. Color of cephalothorax and pedipalps reddish brown; abdomen and legs almost white; dorsal plates of the abdomen somewhat darker.

Chelicerae large, about two-thirds as long as the cephalothorax; digits rather long and only moderately curved; teeth large; spinneret a small, light brown tubercle; about as broad as long. Pedipalps large, long and strong; trochanter about as long as the chelicerae, not swollen and possessing a very small tubercle on its posterior margin near the distal end; femur almost as long as the cephalothorax plus the mandibles, gradually increasing in width as you pass from the base to the tip; tibia almost as long as the femur, with a

long slightly curved pedicel which is equal to about one-third the total length of the segment, pedicel slightly convex on the outer side, but more strongly concave on the inner side; hand shorter than the tibia, its pedicel prominent, as long as broad; fingers a trifle longer than the hand and curved inward toward their tips. All the segments of the pedipalps sparsely clothed with rather long simple hairs, some of these hairs are as long as the width of the femur.

Cephalothorax rectangular, distinctly longer than broad. Eyes absent, also the eye pits. The edges of the cephalothorax are slightly concave at their anterior ends, just posterior to this slight concavity there is a prominent simple hair: anterior margin of cephalothorax slightly convex.

Abdomen much longer than the cephalothorax; dorsal plates very thin, smooth and hairless. The whole abdomen is apparently without any hairs.

Legs rather slender. When the front pair is extended reaching beyond the tip of the chelicerae by half their length; posterior pair stouter than the rest and when extended backward reaching the tip of the abdomen; femur of the last leg almost twice as broad as the tibia.

Length 4 mm.; breadth 1 mm.

Described from a single specimen in the Cornell Collection, lot no. 342. It was collected at Shasta Springs, Calif. This is the second species of this genus to be recorded from the United States.

***Chthonius longipalpus* Banks** (Pl. V, Fig. 15).

This species is extremely abundant around Ithaca, N. Y. If one will turn up most any old log, or an old piece of wood, or a flat stone during the fall of the year, he will seldom fail to find one or more of these pseudoscorpions. They are very curious little creatures, and when disturbed throw back their long "pinchers," held wide open in an attitude of defense. Since they are so very small creatures such fruitless actions seldom fail to produce both amazement and laughter on the part of those who have thus accidentally intruded upon their premises. A drawing of the species is here the first time given.

LIST OF SPECIES EXAMINED, WITH THEIR SITUATIONS AND
LOCALITIES.

Fam. CHELIFERIDÆ.

Gen. CHELIFER.

***Chelifer cancroides* Linn.** Faun. Suec., ed. XXI, 345, 1767.

1. Portage, Wisconsin. Several specimens from under the bark of a conifer. Collected Sept. 1 and 2, 1909, by myself.

2. Ames, Iowa. Scores of individuals found in various situations. A colony of them found under the bark of *Quercus alba*. Collected at various times in 1909 and 1910 by the writer.
3. Ithaca, New York. Several specimens from various situations. Cornell University Collection.
4. Borodino, New York. Two specimens from a bee-hive. Cornell University Collection.
5. Otto, New York.. A large number of individuals taken from under a barn floor. Collected by Professor Comstock: Cornell University Collection.
6. Columbia, Missouri. An abundance of material but no situation given. Collected by C. R. Crosby: Cornell University Collection, lot 305.
7. Havana, Illinois. Several individuals from under the bark of trees standing in shallow water of the Illinois River. Collected by the writer Aug. 9, 1908.
8. Urbana, Illinois. Various individuals from different situations. Collected by Dr. J. W. Folsom and by the writer.
9. Arcola, Illinois. Four specimens from under bark and one in a dwelling house. Collected by the writer.
10. Marshall, Illinois. Several specimens collected under the bark of oaks by the writer in 1908.
11. Farrington, Illinois. Several specimens from under bark. Collected by the writer, Apr. 10, 1909.
12. Xenia, Ohio. Several specimens from under bark. Collected by the writer, Sept. 14, 1910.
13. Austin, Texas. Two specimens, situation not known. Collected by Prof. Comstock in the spring of 1903.
14. Albuquerque, New Mexico. One specimen without situation. Collected by E. J. Oslar, Sept. 10, 1903. Cornell University Collection, lot 248.
15. Palo Alto, California. A single specimen, no situation. Cornell University Collection, lot 305.
16. San Mateo, California. Seven specimens, no situation given; collected Nov. 4. Cornell University Collection.

Gen. CHELANOPS.

Chelanops pallidus (Banks). Can. Ent., XXII, p. 152.

1. Ithaca, New York. Two specimens, one found hanging to the leg of a house-fly. One specimen collected by the writer, the other is in the Cornell University Collection.
2. Arcola, Illinois. Several individuals taken from under bark. Collected by the writer in 1908 and 1909.
3. Marshall, Illinois. Two specimens from under the bark of living oaks, and one from under the bark of a log. Collected by the writer in the fall of 1908.

Chelanops corticis, new species.

1. Havana, Illinois. Two specimens from under bark of trees standing in water. Collected by the writer Aug. 9, 1908.
2. Urbana, Illinois. Two specimens, situation unknown. Collected by Dr. J. W. Folsom in March, 1902.

Chelanops floridæ Balzan. Ann. Soc. Ent. Fr., 1891, p. 524.

1. Lake Lucy, Florida. Several specimens from under bark of dead pine. Collected by P. B. Powell, Feb. 25, 1907. Cornell University Collection.

Chelanops sanborni (Hagen). Record Am. Ent., 1868, p. 51.

1. Muncie, Illinois. One specimen from moss. Collected by the writer June 16, 1908.
2. Urbana, Illinois. One specimen from under a log. Collected by the writer July 27, 1908.
3. Ithaca, New York. Two specimens, no situation given. Collected May, 1902. Cornell University Collection.

Chelanops oblongus Say. Acad. Phila., II, p. 64.

1. Muncie, Illinois. One specimen from under bark. Collected by the writer June 16, 1908.
2. Urbana, Illinois. One specimen from under the bark of a log. Collected by J. W. Folsom, Aug. 19, 1909.
3. Marshall, Illinois. Two specimens from under the bark of logs. Collected by the writer Feb. 6, 1909.
4. Ithaca, New York. Many specimens, but no situations given. Collected by J. O. Martin. Cornell University Collection.

Fam. IDEOBISIIDÆ.

Gen. IDEOBISIUM.

Ideobisium rufulum (Banks). Can. Ent., XXIII, p. 166.

1. Covington, Virginia. Many specimens. Collected by C. R. Crosby, Sept., 1905. Cornell University Collection.

Fam. OBISIIDÆ.

Gen. OBISIUM.

Obisium brunneum Hagen. Rec. Amer. Ent., 1868, p. 52.

1. Ames, Iowa. One specimen under an old piece of wood. Collected by the writer Sept. 11, 1909.
2. Cambridge, Mass. One specimen, no situation given. Collected by C. R. Crosby. Cornell University Collection.

Gen. BLOTHRUS.

Blothrus magnus, new species.

1. Shasta Springs, California. One specimen. Collected in July, 1902. Cornell University Collection, lot 342.

Gen. **CHTHONIUS**.**Chthonius longipalpus Banks.** Can. Ent., XXIII, p. 164.

1. Ithaca, New York. Several specimens from under stones. Collected by the writer during the fall of 1910.
2. Woods Holl. Mass. Three specimens. Collected by J. E. Guthrie.
3. District of Columbia. One specimen, no situation given. Cornell University Collection, lot 241.

Chthonius pennsylvanicus Hagen. Rec. Amer. Ent., 1868, p. 52.

1. Minneapolis, Minn. One specimen from under damp bark on river bluffs. Collected by J. E. Guthrie, Apr. 24, 1900.
2. Hillery, Illinois. One specimen from moss. Collected by C. A. Hart and J. Zetek, March 4, 1908.

Chthonius mæstus Banks. Can. Ent., XXIII, p. 165.

1. Columbia, Missouri. Several specimens. Collected by C. R. Crosby during the month of March. Cornell University Collection.

EXPLANATION OF PLATES.

PLATE I.

Fig. 1. *Chelifer cancroides* Linn. Dorsal view of female, $\times 26$. This figure represents an individual about midway between the extremes of variation.

PLATE II.

Fig. 2. *Chelifer cancroides* Linn. Dorsal view of chelicera, pedipalps, and the anterior part of abdomen of male, $\times 26$. This figure was drawn from a specimen collected at Ames, Ia. It should have the varietal name of *nigripalpus* n. var.

Fig. 3. *Chelifer cancroides* Linn. Dorsal view of the chelicera, pedipalp, and the anterior part of the abdomen of male, $\times 26$. Figure made from specimens collected under a stable floor at Otto, N. Y. It should have the varietal name of *dentatus* n. var.

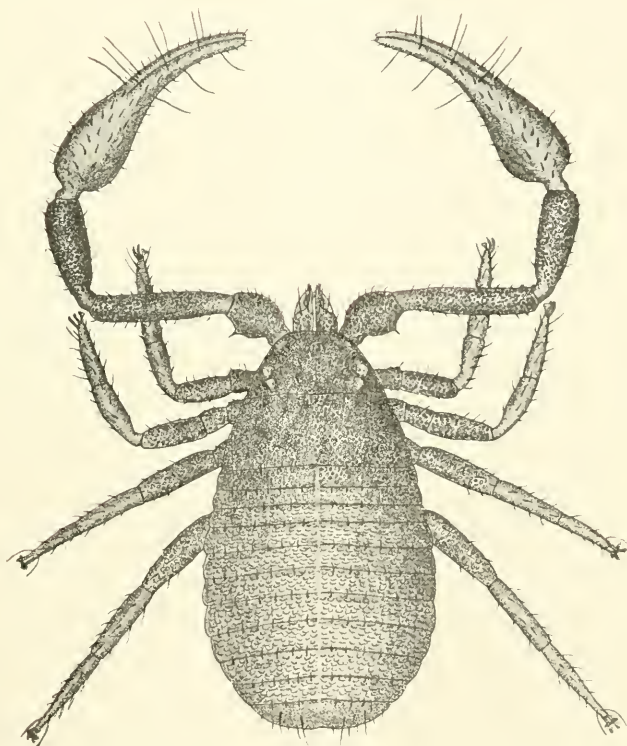
Fig. 4. *Chelifer cancroides* Linn. Dorsal view of the chelicera, pedipalp, and the anterior part of the abdomen of male, $\times 26$. Individuals with the characters shown in this drawing have gone under the specific name of *C. scabriculus* Simon, but they should be considered only as constituting a variety of *C. cancroides* Linn.

Fig. 5. *Chelifer cancroides* Linn. Movable digit of chelicera, from above, $\times 260$.

Fig. 6. *Chelifer cancroides* Linn. Posterior part of cephalothorax and anterior part of abdomen of male, $\times 26$. Drawn from a bark specimen from Xenia, O.

Fig. 7. Same as Fig. 6 except the specimen from which the drawing was made was taken from under bark at Havana, Ill.

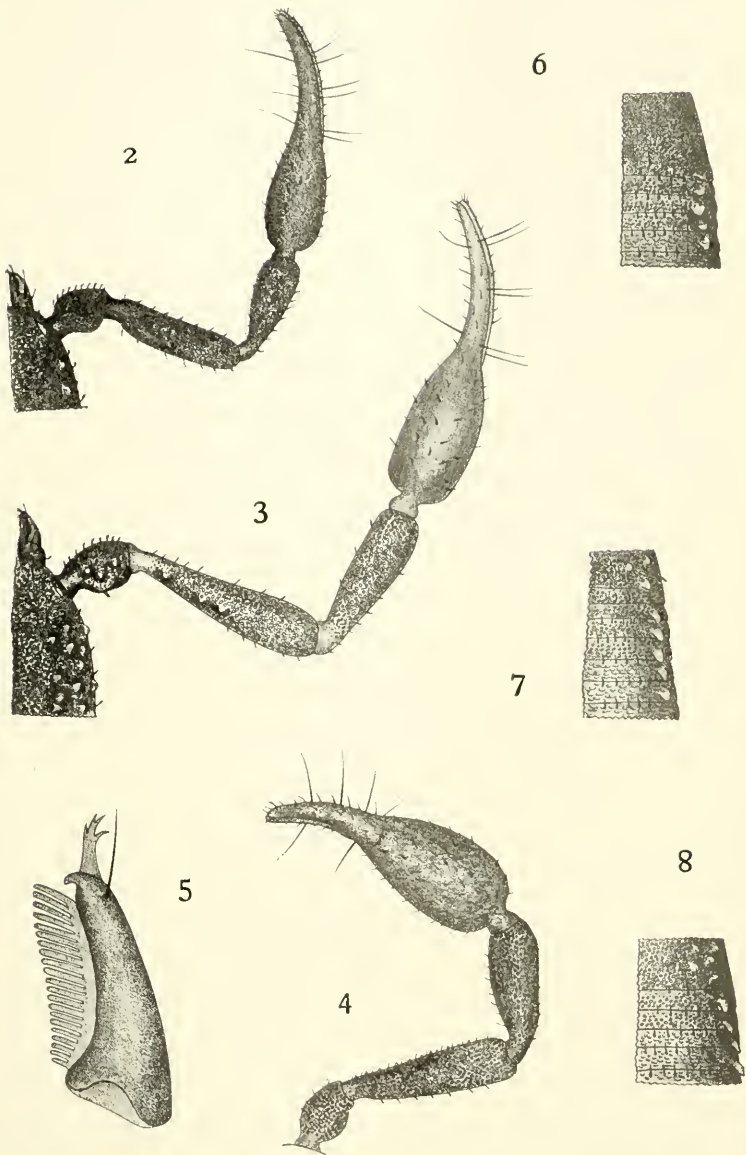
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H. F. EWING *ad nat. del.*

Chelifer cancroides Linn.

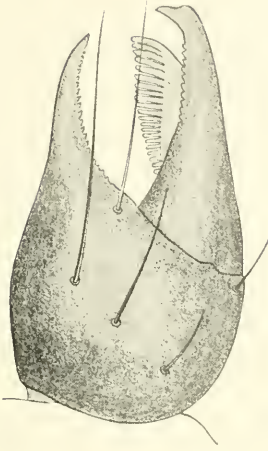




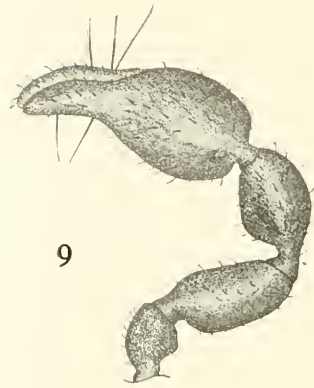
H. E. EWING *ad nat. del.*

Chelifer cancroides Linn.

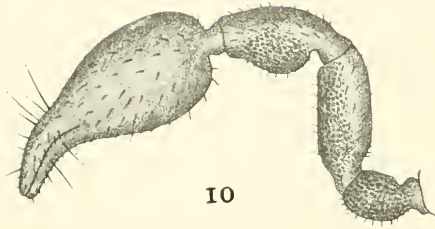




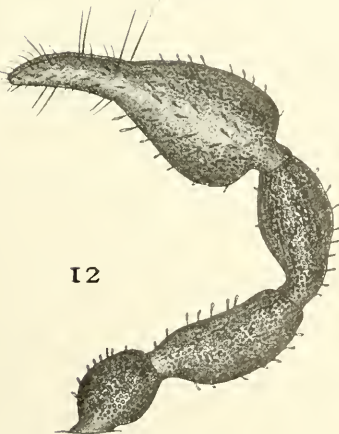
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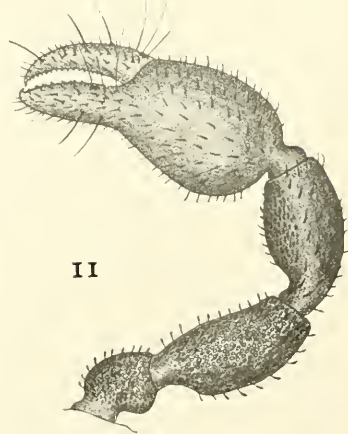
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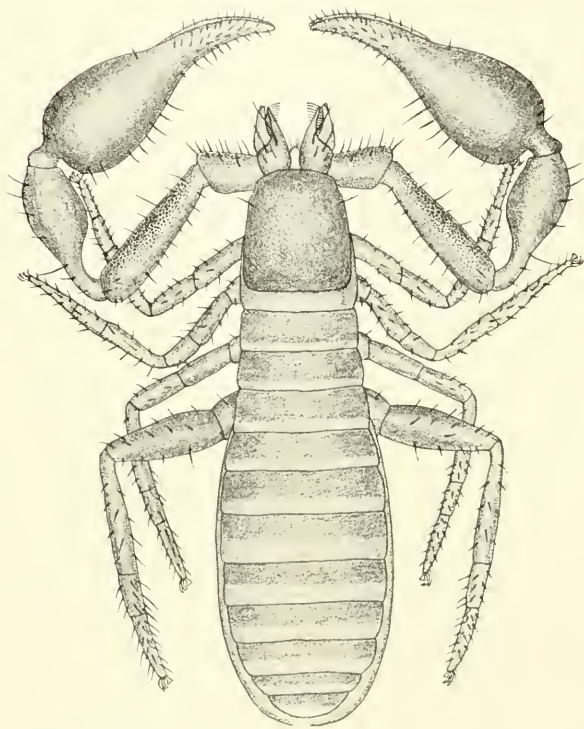


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H. E. EWING *ad nat. del.*

Chelanops and Obisium.

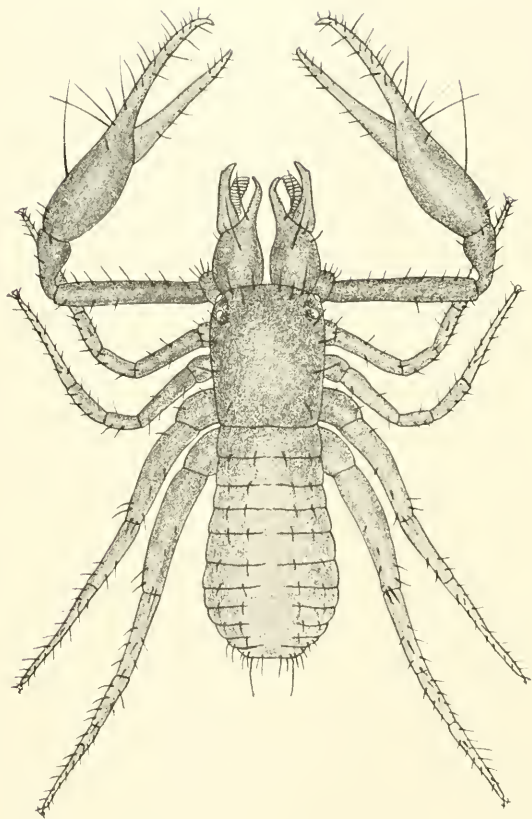




H. E. EWING *ad nat. del.*

Blothrus magnus sp. nov.

15



H. E. EWING *ad nat.* del.

Chthonius longipalpus Banks.



Fig. 8. Same as Fig. 6 except the specimen from which the drawing was made was taken from a dwelling house at Arcola, Ill.

PLATE III.

- Fig. 9. *Chelanops corticis* sp. nov. Right pedipalp from above, $\times 26$.
Fig. 10. *Chelanops floridae* Balzan. Right pedipalp from above, $\times 26$.
Fig. 11. *Chelanops pallidus* Banks. Right pedipalp from above, $\times 40$.
Fig. 12. *Chelanops sanborni* (Hagen). Right pedipalp from above, $\times 40$.
Fig. 13. *Obisium brunneum* Hagen. Right chelicera from above, $\times 260$.

PLATE IV.

- Fig. 14. *Blothrus magnus* sp. nov. Dorsal view, $\times 18$.

PLATE V.

- Fig. 15. *Chthonius longipalpus* Banks. Dorsal view of female, $\times 22$.

ADDITIONAL NEW SPECIES OF NORTH AMERICAN LEPIDOPTERA.

BY WM. BARNES, M.D., AND J. McDUNNOUGH, PH.D.,

DECATUR, ILL.

Family NOTODONTIDÆ.

Schizura biedermani, new species.

Male.—Head and thorax dark purplish-gray with decided reddish tinge on pro- and metathoracic tufts; posterior portion of patagia bordered with black; abdomen dorsally light yellow brown with darker tuft on first segment, beneath light purplish-gray; femora clothed with dark purple hairs. Primaries, ground color olivaceous brown, only apparent on lower portion of wing, costal half shaded with purplish, very dark at base of wing, much lighter, almost gray, towards apex; fine black basal dash, extending below cubital vein to t.a. line; subbasal line distinct, black, geminate, extending only to anal vein; t.a. line geminate, slightly lunulate, indistinct in costal portion, inwardly angled on anal vein; at end of cell a thin black bar, slightly concave outwardly, with a black dash extending from its center to t.p. line; indistinct curved blackish median shade, rarely extending completely across wing, half way between end of cell and t.p. line; t.p. line indistinct in costal portion, composed of a series of incurved light ochreous lunules, shaded with blackish towards base of wing, and followed outwardly by suffused reddish shading; apex light purplish-gray with black apical dash; series of more or less distinct submarginal black dashes, bordered outwardly with whitish; veins in outer portion of wing shaded with

black; terminal row of indistinct reddish dots at base of fringes; these latter checkered, ochreous and black. Secondaries iridescent white, slightly yellowish along inner margin; costal margin and small anal patch smoky brown; veins slightly marked with black near anal angle; fringes white.

Beneath, primaries, dark smoky, broadly white below apex along outer margin; costa white near apex with several black markings; secondaries as above; costal margin black with single light dot; dark anal patch confined to fringes. Expanse, 50 mm.

Female.—More suffused dark purplish-gray on primaries, markings as a rule less distinct than in male; secondaries smoky brown, lighter on disk, inner margin yellowish, with black lunule near anal angle; beneath, dark smoky brown, broadly white along inner margin of secondaries; apical portion of costa on primaries white, with black dashes; outer margin sprinkled with gray; fringes of secondaries whitish; traces of black anal patch. Expanse 59 mm.

Habitat.—Palmerlee, Cochise Co., Ariz., 9 ♂♂, 5 ♀♀, Types, Coll. Barnes.

We take pleasure in naming this species after Mr. C. Biederman, from whom we obtained the specimens. Considerable variation exists in the extent of purplish suffusion and the clearness of the markings, but on the whole the transverse bands are more clearly defined than in any other N. Am. *Schizura*, with the exception perhaps of *unicornis* A. & S.

Larva.—Head shiny brown, slightly marbled with darker; width at broadest portion 5 mm.; lobes united dorsally with scarcely perceptible suture. Body smooth, cylindrical, with slight hump on eighth abdominal segment; meso- and prothorax much contracted, forming a sort of neck; dorsal portion of body black with a faint white geminate dorsal stripe and a broken subdorsal one of similar color; lateral portion yellowish-white, tinged with orange dorsally and crossed by five longitudinal black stripes, the lowest of which is broken and confined to the anterior portion of each segment; a broad stigmatal band of orange-yellow, containing the pale ochreous stigmata; area below band yellowish with two black stripes; legs and prolegs brown, latter with black lateral markings; dorsal hump light brown (as far as could be ascertained); anal plate brown. Length approximately 32 mm.

Described from a full-grown dried specimen received along with the imagines.

Family LASIOCAMPIDÆ.

Dendrolimus juvenalis, new species.

Male.—Antennæ strongly pectinate, light brown; thorax deep black-brown, sprinkled with gray; abdomen reddish-brown, slightly banded with gray and

with black anal tuft, outer margin of both wings scalloped; primaries deep brown in basal half, strongly shaded with gray in outer portion; a broad chocolate-brown band broadest on costa crosses the wing; the inner margin of this is only indistinctly defined with gray, the band tending to become entirely amalgamated with basal portion of wing, which is similar in color; outer margin of band outcurved opposite cell, dentate in lower portion where it is shaded with gray; band contains a minute white dot in cell, situated on a suffused black dash extending from near base of wing outwards to subterminal area; a dentate gray line parallel to outer margin of band, followed by a series of broad, black, submarginal arrow-like marks of which that between veins M_3 and Cu_1 is more in the nature of a transverse dash and situated closer to outer margin; terminal area gray; fringes dark brown. Secondaries red-brown with broad, slightly darker outer border; fringes dark, tipped with white. Beneath, primaries pale brown at base, darker outwardly and along costa, veins marked in light; a whitish diffuse shade on costa near apex and traces of two transverse whitish bands; outer margin sprinkled with purple; secondaries pale brown with banding of primaries, basal portion of costa dark brown, extending inwards along first transverse band; outer margin suffused with purplish; fringes as above. Expanse, 60 mm.

Female.—Primaries pale reddish-brown, basal area and band slightly darker; all markings much paler and less contrasted than in ♂, tending to obsolescence; secondaries, still paler, with darker marginal band of ♂ scarcely traceable; beneath unicolorous light red-brown. Expanse, 73 mm.

Habitat.—Cochise Co., Ariz. 2 ♂♂, 2 ♀♀, Types, Coll. Barnes.

Very closely related to *Gloveria venerabilis* Edw. as figured by Druce (Biol. Cent. Am. Het., Pl. 85, fig. 7). Through the kindness of Dr. Dyar we have examined a ♂ agreeing well with Druce's figure; our specimens are much darker in ground color, the gray banding of primaries more irregularly dentate, especially the case with the inner of the two lines beyond the cell, and the submarginal line is considerably more broken and irregular towards the anal angle than in *venerabilis*. Edwards's description was made from a single ♀ and does not agree very well with the 2 ♀♀ before us from Arizona. When more material can be obtained it may prove but a local form of *venerabilis*, but for the present the differences noted warrant it being kept distinct. The specimens were received from Mr. Owen of Los Angeles, who bred them during a collecting trip in Arizona.

Family NOCTUIDÆ.

Cerma nana, new species.

Male.—Palpi but slightly upturned, black, tipped with orange; antennæ very faintly ciliate; front and thorax ochreous; abdomen gray; primaries

ochreous, somewhat irrorate with brown in median and subterminal areas; dark patch on costa at base; t.a. line dark brown, rather indistinct, arising from a dark spot on costa, irregularly dentate, outwardly oblique, bordered inwardly with orange, and preceded by some slight dark scaling; orbicular and reniform broadly outlined in orange with a dark center and outer margin; latter spot often indistinct with large triangular smoky spot directly above it on costa, and dark shading below extending to inner margin; t.p. line dark brown, finely dentate, indistinct in costal portion, slightly incurved on submedian fold, shaded outwardly with orange; costal margin beyond triangular spot smoky with several yellowish dots; subterminal area shaded with dark; faint broken black terminal line preceded by slight orange scaling; fringes dusky, lighter in outer half with minute ochreous basal dots opposite the veins. Secondaries smoky brown with indistinct discal spot and median line, fringes lighter, with ochreous basal dots. Beneath, primaries smoky brown with lighter shading in costal portion and several ochreous dots on costa near apex; fringes as above; secondaries light ochreous, heavily sprinkled with dark scaling, and with prominent discal lunule and median band; fringes pale ochreous. Expanse, 19 mm.

Habitat.—San Diego, Calif. 6 ♂♂. Type, Coll. Barnes.

The pale ground color, with dark costal patches, and orange shading to maculation should readily distinguish this species.

***Cerma oaklandiæ*, new species.**

Male.—Palpi upturned, whitish, shaded with black outwardly on second joint; antennæ ciliate; front smooth, light gray; vertex of head and thorax scaled with gray, black and olivaceous; abdomen gray; primaries gray, heavily and evenly irrorate with blackish and olivaceous scaling, with indistinct maculation and no contrasting portions of wing; a dark basal line in costal portion of wing; t.a. line dark, inwardly oblique to cubitus, sharply angled just below this vein, thence outwardly inclined to just before inner margin where it again forms a slight angle; area between it and basal line but very slightly lighter than remainder of wing; orbicular and reniform indistinct, whitish with darker centers, the former circular, the latter not well defined towards costa; beneath orbicular traces of a dark angular mark; t.p. line irregularly dentate, well curved around reniform, from thence to inner margin practically parallel to outer margin, bordered outwardly very slightly with white; subterminal area with a few dark shades below apex and a broken dark terminal line; fringes checkered, with dark median band; secondaries smoky, lighter towards base with prominent oval discal spot. Beneath smoky; primaries with t.p. line slightly defined in blackish and proceeding from a black spot on costa; fringes gray, checkered with black; secondaries lighter than above with dark discal dot and dentate median line; fringes unicolorous gray; black broken terminal line to both wings. Expanse, 23.5 mm.

Habitat.—Oakland, Calif. 2 ♂♂. Type, Coll. Barnes. Co-type, Coll. F. H. Wolley-Dod.

This species is very closely related to *C. fascia* Sm. of which we possess the co-type. Apart from its smaller size it may be distinguished by the more even coloration of primaries, the contrasting areas being practically lacking. The maculation is more indistinct than in *fascia*, and the secondaries more smoky, with an oval discal spot and not a lunule; the vertex of head is scaled as the thorax, whereas in *fascia* it is creamy white like the front.

***Cerma flavidior*, new species.**

Male.—Palpi upturned, shorter than in allied species, creamy, with second joint outwardly black; front and vertex of head ochreous; thorax largely scaled with orange, mixed with blackish; abdomen silky gray; primaries deep purple, heavily scaled with yellow along costa, and with areas between basal and t.a. line, and beyond t.p. line bright yellow; maculation much as in other *Cerma* species; t.a. line dentate, slightly outwardly oblique; orbicular circular, yellowish, with dark center and dark costal shade above it, reniform obscure; t.p. line dentate, sharply angled just below costa, well exerted beyond cell, strongly incurved below reniform; s.t. line represented by a brown costal shade before apex, continued faintly across yellow area of wing to anal angle, where it forms several more distinct brown dashes; prominent dark broken terminal line; fringes ochreous; checkered slightly with darker. Secondaries slightly smoky with faint discal spot and median line; fringes concolorous. Beneath ochreous, shaded with smoky brown; prominent discal dash and subterminal line on both wings; costa of primaries with dark markings near apex. Expanse, 27 mm.

Habitat.—Esmeralda Co., Nevada. 1 ♂. Type, Coll. Barnes.

The broad yellow sub-basal and terminal areas should serve to distinguish this species from *C. fascia* Sm. with which it is practically identical in maculation. We should have hesitated in regarding this as a good species if it were not for the palpi, which are much shorter than in *fascia*. In this species they extend well to vertex of head, whilst in *flavidior* they barely reach the middle of front. Hampson has used this feature to separate the two genera *Bryophila* and *Cerma*, actually placing *fascia* in the first mentioned genus along with *sarcepta* Barnes, and leaving our other N. Am. species where they were. If the species should be separated at all on this point, an examination of the palpi has convinced us that *cuerva* Barnes, *galva* Stkr. and our new species *oaklandiae* should also be removed from their present genus and placed in *Bryophila*, whilst *sarcepta* Barnes must be restored once more to *Cerma*. Not having had the chance to examine the type of the genus *Bryophila* we consider it safer to leave for the present all the species in the genus *Cerma*.

ON THE IDENTITY OF *THECLA MUIRI*, HENRY EDWARDS.

By WM. PHILLIPS COMSTOCK,

NEWARK, N. J.

When Henry Edwards described *Thecla muiri* in 1881 (*Papilio*, Vol. I, p. 53), he stated that it was "allied to *T. nelsoni* Bdv., but undoubtedly distinct." Nevertheless, W. H. Edwards in his catalogue of 1884 (*Revised Cat. Diurnal Lep.*, etc.) places *muiri* as a variety of *T. nelsoni*, Bdv., with no comment. Other cataloguers (H. Skinner, H. G. Dyar) since then have followed suit and the insect has apparently escaped notice in literature except for these catalogue references and a reference and figure in Wright's *Butterflies of the West Coast*, which is erroneous.

I have recently been studying a series of *Thecla blenina* Hew., numbering about eighty specimens, about half of which were from Eureka and Stockton, Utah, and the others from Fort Wingate, New Mexico. In working over this material I found a predominance from the Utah localities of a form in which the general tone of the under side of the wings is a purple or violet brown. From New Mexico, on the other hand, the specimens are mainly of the typical form, with well defined green under-coloration. By working over the insects I found a complete set of intergrades between the two extremes of under-coloration and selected a series of thirty specimens which showed intergradation. This series presented wide minor color variations and some striking variability in the discal line of the secondaries.

Being familiar with the typical material of the Henry Edwards collection, I suspected that the purple form might agree with *T. muiri*, although I got no encouragement from a study of the original description. I took a series of specimens to the American Museum of Natural History for purpose of comparison, and found two females in my series which agreed with the type female of *muiri* in every particular except that the band across the disc of the primaries in the type started from the costa a shade nearer the apex than in my specimens. Upon examination of the other specimens in my series,

I observed a like amount of variation in the starting of this line in certain individuals, so that I selected the two females above mentioned as identical with the type. Male specimens in my series did not agree so closely with the type male *muiri*. The differences, however, were entirely in the shading of the ground color, and not in the marking. The marking of the type male and female of *T. muiri* were exactly identical with the marking of the majority of the specimens in my series. The result of my examinations is that I consider my series of what I had thought a purple form of *T. blenina* from Utah localities to be identical with the types of *T. muiri*, which came from Mendocino County, Cal.

I thus arrive at my main conclusion that *T. muiri* Hy. Edw., is related to *T. blenina* Hew., and not to *T. nelsoni* Bdv., to which it has heretofore been attributed. Secondly, I consider that the name *muiri* should be retained to designate the purple form as a variety of *T. blenina*, and that our lists should be corrected to read as follows:

***Thecla blenina*, Hew. var. *muiri* Hy. Edwards.**

In reference to the original description of *T. muiri*, I wish to point out that it is entirely inadequate and positively misleading to any one trying to identify an insect from it. The description omits mention of the ground color beneath the wings which, as the type insect shows, is a violet or purple brown shading with scattered black scales. Moreover, it points out a distinction between *T. muiri* and *T. nelsoni* which does not exist; namely that "the fringes (in *T. muiri*) are concolorous with the wings instead of white" (in *T. nelsoni*). The fringes in the type of *T. muiri* are not concolorous with the wings, but grayish and, in fresh specimens of the insect, of a sordid white. The fringes in *T. nelsoni* are grayish also and noticeably darker than the ground color of the wings, and not white.

ON XANTHÆCIA BUFFALOENSIS GRT. AND
PAPAIPEMA LATIA STRK.

BY HENRY BIRD,

RYE, N. Y.

But few of the noctuid moths described by Grote from the eastern United States have seemed more elusive or entirely submerged in oblivion since being first exploited than *Xanthæcia buffalocnsis*. Described by him in 1877 (Can. Ent., IX, 88) the single example constituting his type was ultimately deposited in the British Museum and American students generally were unfamiliar with its exact habitus. Until the appearance of Hampson's Catalogue, Vol. IX, 1910, the species had never been figured and as it was known to approach a certain section of the numerous *Papaipema* group, left an uncertainty which its further non-appearance failed to excite. The type example is presumed to have been a capture at light, but if bred no reference was made to the fact or to the food-plant. Its larva is beyond question a borer in some herbaceous stem or root, with a habit and life cycle similar to the *Papaipema* larva, and when the writer's investigations of the latter led to Buffalo, N. Y., the type locality of *buffalocnsis*, this species was kept particularly in mind. While another Grote species, *P. necopina*, described from this locality in 1876 and long misunderstood, was found to be flourishing in larval abundance, no sign or intimation of *buffalocnsis* could be detected. Grote had described the species under the generic group *Ochria*, associating with it his species *sauzalita* from California and considered them congeneric with *O. flavago* of Europe. In Hampson's recent studies the new genus *Xanthæcia* has been created for *buffalocnsis* and *flavago*, their form of thoracic cresting and tuberculate frons differing from either *Papaipema* or *Hydræcia*, which have the head smooth in front. *Flavago* seems to be common and widely distributed, has been known for a century, and its list of food-plants includes *Carduus*, *Arctium*, *Verbascum*, *Artemisia*, etc. Such a list gives little clue, if an analogy be drawn with *Papaipema*, for it would suggest that such cosmopolitan weeds are those used by the latter when a substitute becomes necessary for their preferred, indigenous food-plant. The very rarity of *buffalocnsis* might argue that it does not make a choice

among such common weeds, though the probability that it might work in any aquatic plant would be dissipated. The European flora now supporting *flavago* can be little like primordial conditions whereas we may expect to find *buffaloensis* still boring its primitive food-plant. Failure to discover this larva at Buffalo served to intensify interest in the species, so it was with much gratification that an example from Mr. F. Marloff, taken at Oak Station, Pa., October 1, 1910, was recently identified for him as the lost Grote species. In replying to congratulations over the re-discovery Mr. Marloff stated he had captured the specimen at a street lamp, in a prolific locality where a roadway winds down from the high country into a valley. At this point *Papaipema furcata*, *P. merriccata* and *Chaphora fungorum* have been taken, the varied flora of the immediate vicinity offering special advantages for the commingling of desirable species.

There could not be dispelled, however, the notion that the insect had been seen before and the impression finally became strong that in *Papaipema latia* Strk. we had previously met a counterpart. Some years ago Stecker's type of *latia* had been seen and upon comparing my notes and pencil sketch of the same with the Marloff specimen and Hampson's figure it seemed quite clear that but one species could be involved. Though the type of *latia* was not examined for a tuberculate frons, my note reads: "It seems probably an *Ochria*." Still further confirmation was needed and application was made to Mr. W. J. Gerhard, of the Field Museum, Chicago, who has the Strecker collection in charge. He very kindly compared *latia* type with Hampson's figure of *buffaloensis*, following my suggestion to examine for a tubercle on the frons of *latia*.

Mr. Gerhard reports that my surmise is undoubtedly correct, stating that he "fails to see any difference that would justify anyone in regarding them as being two distinct forms." The slight difference he can detect is that Strecker's type is less highly colored and that the postmedial line is more fasciate than Hampson's figure, both of which features were apparent in the Marloff specimen. Most important of all, he states that "the front between the eyes has a distinct tubercle, which, however, is not so pronounced as on the other species of the genus, namely, *flavago* of Europe, which was likewise examined." Had *latia* a smooth frons no matter how close the superficial resemblance, it would remain distinct from *buffaloensis*, but with the

tubercle and the other features agreeing, there is no room for question.

Strecker described *latia* as an *Hydracia* in 1899 (Lep. Rhop. & Het., Suppl. 2, p. 6), so the earlier Grote name must be retained. Its early history is unknown, and but one other example identified as such, is all that the writer recalls having knowledge of. So the quest for two rarities merges into one, a thing to be thankful for when we are seriously pursuing larval histories.

ANOTHER SPECIES OF PERO HERR. SCHAEF.

BY RICHARD F. PEARSALL,

BROOKLYN, N. Y.

In Proceedings of U. S. National Museum (Vol. 38, pp. 359-376) Mr. J. A. Grossbeck has recently published a very thorough and excellent paper, separating the various species formerly massed as one under the old genus *Azelina* Hub., and placing them under the genus *Pero* Herr Sch., where they rightly belong. The inclusion of *occidentalis* Hulst (*Marmarca*) and of *colorado* Gross., both having dentate antennæ in the males, does not accord with my present opinion, but it does not detract in any way from the value of the service he has performed. In concluding a brief summary of results, he remarks (page 360) "that several examples have been treated as geographical races, but may yet be found to be distinct." One of these I have received since my material was submitted to him in a series of nearly one hundred, including both sexes. Mr. Grossbeck, who has seen them, advises me that he had several poor specimens before him, but the similarity in genitalia to *modestus* Gross and the paucity of his material deterred him from separating them from it at that time. It is to be noted that the home of this new species is in northern Utah, while *modestus* occurs most plentifully in southern and central Arizona, though I have one straggler from Durango, Col. All of my specimens were taken from May 7 to June 24, excepting a single pauperized male on August 3, while my large series of *modestus* were captured in September and October. Apart from their apparent unlikeness when the groups are contrasted, they can not be seasonal

forms of the same species, because no early records of *modestus*, as I have limited it, are obtainable. I have given, in describing it herewith and with great satisfaction, the name of

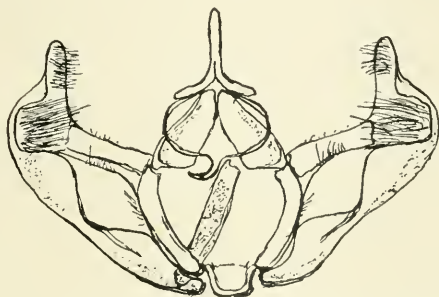


Fig. 1. Male genitalia of *Pero grossbecki* sp. nov.

***Pero grossbecki*, new species.**

Expanse 30-32 mm. Palpi and front dark gray, the former tipped with white. Vertex paler or whitish in some cases. In all my examples a white line crosses front below antennæ, which are yellowish white barred with dark gray basally. Thorax an even dark gray. Abdomen paler, finely flecked with black. The front and thorax are often washed with purplish. Ground color of wings above, ashen darkened by a sprinkling of black atoms, heaviest over median area of primaries, and gathered into short strigations over basal area. Inner line of primaries black, clearly defined, strongly scalloped, that beneath costa larger and longer. Median area heavily sprinkled with black and having an irregular heavy black shading across wing, within outer line, paling out centrally. This area is sometimes tinged with pale chocolate, but never exhibits the ruddy brown of *modestus*, nor the patch of rusty scales, near to or surrounding the discal dot, as in that species. Outer transverse black line clearly defined, strongly sinuate. Outer space paler and smoother; a broad pale, purplish ashen band, becoming a whitish irregular line at center, succeeds the outer line—beyond that to margin a little darkened. Marginal black line not present in its entirety in even the best examples, but often running only from angle at vein 4 around anal angle to median area, heavier and darkened at the latter portion. Intervenular white dots varyingly present, that between veins 3 and 4 ringed with black, or entirely black. Fringe like ground color. Discal dots small linear or angulate, white. Transverse line on secondaries black, bordered externally with white and much waved, the convolutions smaller toward costal region. Outside this line to margin the wing is paler, except at anal angle where black scales are clustered, and the marginal line becomes broadly black, sending inward between veins, two or three black triangles. A white dot circled with black between veins 6 and 7 at margin

is present in nearly all examples. Fringes colored as in primaries, paler basally, and sometimes tinged with brown. Discal dots dusky, oval, very faint. Beneath silvery gray, dusted with black atoms. On primaries these are heaviest along costa and at outer margin. Extra discal, if present, is not prominent. Discal dots small, white. Intervenular dots at margin reproduced as above, but all white. Marginal line hardly apparent. Secondaries have extra-discal strongly reproduced, black, heavier toward inner margin and much more serrate than above, externally bordered with white. Discal dots large, oval, jet black, frequently pupilled with white.

Type: male and female from Eureka, Utah, May 21, 1909, with co-types. Thirteen males and 5 females are retained in my own collection. The latter from same locality taken in 1909 and 1910 with the exception of one male from Stockton, Utah, August 3, 1902, referred to previously. This may represent a fragmentary second brood at that period. The rest of my co-types were captured between May 7 and June 14. As grouped they present a marked contrast in black and gray to *modestus*, *peplaroides* and *giganteus*, with their rusty browns and reddish hues.

The genitalia as shown in the figure differ a little from those of *modestus*, but seem to me even shorter and broader.

THE OCCURRENCE OF THE MYMARID GENUS MYMAR HALIDAY IN NORTH AMERICA.

By A. A. GIRAULT,

URBANA, ILL.

The type genus of the family Mymaridæ has been found to occur in England, Germany, Austria, perhaps Italy in Europe and from the islands of Saint Helena (Africa) and Ceylon (Asia; *Mymarilla* Westwood), but has never been recorded as occurring in the western hemisphere. However, I have found in the collections of the United States National Museum a single tag-mounted female specimen of a species of the genus from Pennsylvania, which I have been fortunate in transferring without injury to a slide mount of xylol-balsam. The specimen is excellently preserved and represents a typical species of the genus, the fore wings with long, slender petioles, the small, paddle-like blade portion at the apex with very long, delicate marginal cilia,

the apical half of the blade portion clouded and the venation absent; the posterior wings are aborted, without a blade, merely like a stiff, thick bristle, long and slender but very much shorter than the fore wings. The second funicle joint of the antenna is abruptly very long and slender and the scape is unusually long and slender as with this genus.

This North American species seems to resemble very closely *Mymar pulchellum* Curtis, but according to Foerster's (1847) description of the latter differs from it in having the second funicle joint of the antennæ much longer (11 or more times) than the third funicle joint, whereas in female *pulchellum* "das 1ste Glied der Geissel ist etwas länger als das Stielchen, das 2te und 3te dagegen sehr stark verlängert, fast von der Grösse des Schaftes, das 3te aber ist immer noch ein wenig länger als das 2te, die 3 folgenden Glieder sind wieder sehr kurz." Westwood (1879) gives a figure of the male of *pulchellum* and says of the female: "This insect has . . . antennæ . . . 9-jointed in the female, with the fourth joint remarkably elongated and slender"; from which it may be inferred that the other joints are comparatively short. The figure (male) shows a longer blade portion of the fore wing than is the case with the American specimen and Westwood's remarks on the species *pulchellum*, not agreeing by inference with Foerster's descriptions, would lead to the belief that his specimens represent a distinct species. As species of Mymarids are more numerous than is generally supposed, I can see no reason why this should not be the case, especially since Westwood captured his specimens at large and did not identify them by actual comparison. The same, I think, may be said of Foerster's specimens, as the following would lead one to infer.¹

Through the kindness of Dr. L. O. Howard I have been enabled to see Curtis' (1832) description and figure of *M. pulchellum* which agree with the specimen before me but not with Foerster's description of the species. Curtis' figures appear to be excellent ones and my specimen agrees with them as previously stated; only the short rows of discal cilia in the cephalo-distal portion of the blade, cephalad of the longitudinal row of cilia running the blade's entire middle length, are not shown or indicated to be present. The antennæ agree as

¹ Foerster's specimens are more probably different from *pulchellum* than Westwood's since the latter's specimens agree better with Curtis' figure.

closely as can be expected and although the tarsi in the figures are shown to be five-jointed in some instances, hence the proximal joint not comparatively long and slender, it is quite evident to me that in this respect a mistake was made, the proximal joint of the tarsi being divided in the figures or else the distal joint extended to indicate claws and pulvillus. So although my specimen differs perhaps in having two short rows of discal ciliation in the cephalic outer portion of the paddle-like wing blade² and also in having a longer proximal tarsal joint, nevertheless the likeness to the figures and description is so striking and feels so true that I give up my former intention of describing this species as new, substituting my impression that it is identical with *Mymar pulchellum* Curtis. This is the first European species of Mymaridæ to be found in North America.³

The following descriptive notes were made from the specimen in my possession, given especially for the reason that we may have a distinct species here after all, and that my identification may be wrong:³

Female.—Length, 0.90 mm., slender, visible to naked eye with difficulty; the species described and figured by Curtis excepting as may be pointed out. Body uniformly gamboge, the eyes dark reddish, the abdomen with a large fuscous area distad. Legs and antennæ uniformly lighter, the club of antennæ fuscous, the distal tarsal joints dusky. The figure given by Curtis shows some greenish on the thorax and bluish on the head not present here but which may be ascribed to the drawing.

Legs slender, the tarsi 4-jointed, the joints long, the proximal joint lengthened, twice the length of the distal joint, a third longer than the second joint. Strigil present on cephalic legs. Ovipositor not exerted. Parapsidal furrows complete. No apparent sculpture or pubescence.

Petiole of abdomen two-thirds the length of the body of abdomen, nearly twice longer than the short, obconic caudal coxæ; trochanters 2-jointed. Tibial spurs single. Vertexal carina present.

Fore wings longer than the body, petiolate, the petiole very long, uniformly slender, like a thick hair, as long as the body, distinctly more slender than the petiole of the abdomen, clothed along each edge with short, minute spines pointing distad and separated from each other in the line for some distance (distal two-thirds of the wing petiole); at the end of this long petiole is a comparatively small wing blade, slightly over a third as long as

² Probably omitted by Curtis, inadvertently.

² I will give evidence elsewhere, showing that the species is new, however. It may be called *Mymar venustum*. Its characteristics will be given later.

³ See previous footnote.

the whole, its cephalic margin a continuation of the petiole, straight but curving around the apex, the caudal margin a long, sloping convexity; the blade is paddle-shaped, not quite one-half distad is deeply fumated (smoky brown); the fumated area with its proximal margin oblique, running from the costal edge disto-caudad. The discal ciliation of the blade consists of a single longitudinal line of moderately long cilia running through about the middle of the blade, but cephalad of the middle, terminating some distance before the sharp base of the blade; the cilia become somewhat more crowded and longer distad and the line runs to the apex; in the distal two-thirds of the fumated area, cephalad of the distal third of the long, nearly central line, there are two short lines of discal cilia running to the apical margin, the cephalic one shorter (about 3 to 6 cilia), the caudal one slightly longer (about 5 to 7 cilia); both lines may be somewhat confused in which case a third short line is indicated; around the blade margins is a row of fine discal cilia; also of marginal cilia which are fine but distinct, projecting out between the long primary marginal ciliation; these secondary marginal cilia are subequal in length to the true discal cilia; disk of blade free from cilia caudad of the nearly central row. Marginal cilia very long, slender, graceful, equal at both margins, somewhat shorter around the apex, about $2\frac{1}{2}$ times longer than the greatest width of the blade, about as long as the scape and pedicel combined.

Posterior wings aborted, without a blade, merely a comparatively long, acuminate bristle-like appendage, by far not reaching half-way to the base of the blade of the fore wing, distinctly shorter than the scape, about a third of the length of the petiole of the fore wing (excluding blade).

Bulb of scape short; scape very long, curved somewhat, slenderer in the middle, slightly shorter than the second funicle joint, about four times the length of the pedicel and twice or more the length of the club, distinctly thickened at each end; pedicel obconic, usual, distinctly longer than wide, slightly shorter than the proximal funicle joint; the latter slender, about five times longer than wide, longer than any of the funicle joints except the second, shorter than the club by about one-half; second funicle joint abruptly very long and slender, subequal in length to the combined lengths of the other five funicle joints, very slightly thickened distad, rod-like, the proximal funicle joint rod-like; third and fourth funicle joints abruptly very short, cylindrical ovate, not as long as pedicel, subequal to each other; funicle five a fourth longer, six a fourth longer than five and distinctly thicker, somewhat shorter than the pedicel. Club slightly larger, slender ovate, longer than funicle joints four, five and six combined. Pubescence soft, short, moderate, not conspicuous.

(From a single specimen, $\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.)

The foregoing notes were made from a single female specimen in the collections from the United States National Museum, Washington, D. C., formerly on a tag labelled "Greensbrg., Pa., Jly. 3-05,"

now in the same collection mounted on a slide in xylol-balsam (temporarily in my possession).

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A NEW CAMPONOTUS FROM CALIFORNIA.

BY WILLIAM MORTON WHEELER,

BOSTON, MASS.

Camponotus anthrax, new species.

Worker Major.—Length 7-9 mm.

Belonging to the *fallax* group. Head large, as broad as long, broader behind than in front, with broadly and feebly excised posterior border, rounded posterior corners and convex sides; in profile very convex above, flattened below. Eyes rather large, broadly elliptical, flat. Mandibles convex, 6-toothed. Clypeus feebly convex, ecarinate, its anterior border impressed in the middle, with a small but distinct notch. Antennal scapes not reaching the posterior corners of the head, slender and not flattened at the base, distinctly incrassated towards their tips. Thorax not longer than the head including the mandibles, and in front half as broad as the head; in profile feebly and rather evenly arcuate above, laterally compressed in the meso- and metapleural regions. Promesonotal suture very distinct; metanotum clearly outlined. Epinotum in profile with subequal base and declivity, forming together an obtuse angle, the former nearly horizontal, the latter slightly concave. Petiole nearly as broad and high as the epinotum, compressed anteroposteriorly, with blunt, rounded and entire border; its anterior and posterior surfaces both flat and the anteroposterior diameter the same above as below. Gaster elliptical, its dorsal surface distinctly flattened. Legs as usual, the fore femora slightly incrassated, the hind tibiae broadly elliptical in cross-section, their surfaces neither flattened nor sulcate.

Head and mandibles shining, especially the cheeks, gula, posterior corners, vertex and occiput; clypeus and front more opaque through being

rather sharply shagreened. Whole surface of head sparsely punctate, the punctures being more numerous on the mandibles, cheeks, clypeus and front than on the sides, posterior corners and occiput. Thorax shining, the pro- and mesonotum finely, the pleuræ, epinotum and petiole more coarsely shagreened, so that these parts are more opaque. Pro- and mesonotum coarsely and sparsely punctate. Gaster glossy, its surface coarsely and transversely shagreened and covered with small piligerous punctures. Legs shining, delicately shagreened.

Hairs and pubescence pale yellowish; the former long, sparse and erect on the upper surface of the head and thorax, on the gula, border of petiole and dorsal and ventral surfaces of the gaster. Tips of femora and antennal scapes with a few short hairs. Pubescence sparse, short and inconspicuous on the head, thoracic dorsum, legs and scapes, longer on the upper surface of the gaster. Sides of head without hairs or pubescence. Hind tibiæ without bristles along their flexor surfaces.

Deep black; antennal funiculi and sometimes also the legs, mandibles, clypeus, anterior border of the head and thoracic sutures more or less tinged with dark brown or red; posterior borders of gastric segments brownish yellow, with a golden reflection.

Worker Minor.—Length 3.5–6 mm.

Differing from the worker major in the small size and shape of the head, which is somewhat longer than broad, with less convex sides and more nearly straight posterior border. Mandibles 5-toothed. Clypeus subcarinate, the notch in the middle of its anterior border small and indistinct. Antennal scapes reaching nearly one-third their length beyond the posterior corners of the head. Eyes rather large, very feebly convex.

Sculpture, pilosity and color as in the worker major, except that the sides and posterior portions of the head are less shining, the mandibles are red and the sparse pubescence is more conspicuous on the upper surface of the head and thorax.

Female.—Length 9–11 mm.

Resembling the worker major. Head longer than broad, a little broader behind than in front, with straight sides and posterior border. Antennal scapes reaching a little beyond the posterior corners. Thorax through the wing insertions as broad as the head. Epinotum with short, convex base and longer, abrupt declivity. Petiole in profile narrowed from the base upward to a sharp border, which is rounded, entire and slightly produced in the middle line when seen from behind. Wings long (10 mm.).

Sculpture, pilosity and color much as in the worker major, except that the pronotum and scutellum are more glabrous and shining and the upper surface of the gaster is smoother and less glossy. Wings tinged with brownish; veins and stigma pale brown.

Male.—Length 7–8 mm.

Head, including the eyes, as long as broad, rounded behind, with straight

cheeks as long as the eyes. Eyes and ocelli rather small. Mandibles edentate. Clypeus convex but ecarinate, with rounded, entire anterior border. Antennæ slender; scapes extending fully one-half their length beyond the posterior margin of the head; first funicular joint but little incrassated at the apex, as long as the second. Thorax long and robust, broader than the head; base of epinotum convex, nearly as long as the declivity, which is abrupt and somewhat flattened. Petiole low in profile, thick at the base, narrowed towards the summit, with a moderately sharp border; seen from behind, it is transverse and deeply excised in the middle. Gaster and legs of the usual shape, the latter slender, with large pulvilli.

Body shining, finely and densely shagreened. Mesonotum with a few scattered foveolæ.

Pilosity and pubescence similar to those of the worker, but the hairs are shorter and the pubescence is more delicate and somewhat denser, at least on the gaster.

Body and appendages deep black; bases of genital valves piceous; pulvilli white. Wings like those of the female, but slightly paler.

Described from numerous specimens of all four phases taken January 1, 1911, from five colonies, which I found nesting in the ground under large stones among the chaparral at an altitude of about 1,000 feet at the mouth of San Ysidro Canyon in the Santa Ynez Mountains near Santa Barbara, California.

C. anthrax closely resembles the typical *C. fallax* Nyl. of Europe and our North American var. *nearcticus* Emery, but is readily distinguished by its deeper black color, the larger, more shining and laterally more convex head of the soldier, the peculiar sculpture and pubescence of its gaster and the 6-toothed, instead of 4-5-toothed mandibles. The head of the worker major is, indeed, much like that of *C. sayi* Emery and the gaster in sculpture and pilosity resembles that of certain forms of *C. herculeanus*, e. g., the var. *whymperi* Forel. The new species differs, moreover, from the other members of the *fallax* group in habits, since it nests in the ground and not in dead wood.

HABITS OF BELOSTOMA (=ZAITHA) FLUMINEUM
SAY AND NEPA APICULATA UHLER, WITH
OBSERVATIONS ON OTHER CLOSELY
RELATED AQUATIC HEMIPTERA.

BY HENRY H. P. SEVERIN, PH.D.

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Collection of Material.—*Belostoma flumicum* inhabits ponds or sluggish streams. While specimens were often captured, in our experience, in shallow water a few inches in depth, they were frequently taken in deeper waters. During early autumn before the leaves had fallen, this aquatic hemipteron was often obtained by raking out floating masses of vegetation from the water; it was also stream or pond and turned over on the shore. Later in fall, specimens were captured by scooping up with a water-net the leaves which were floating on, or had sunk below the surface of the water. After the water was covered with a thin coating of ice, these insects were taken by pulling up with a rake the sediment on the bottom of the stream or pond, or the roots of grass and mud along the bank. Some of the bugs, which happened to escape by this method, were caught by making a rapid current in the water with a net and then suddenly reversing the movements of the net by scooping against the current. A large number of individuals, when taken out of the water by any of these methods, would not feign death, but would right themselves, if they happened to drop on their backs, and scramble eagerly to escape. Many, however, were found while feigning death, although often with great difficulty, either on account of their rather close resemblance in color to the leaves that had fallen into the water or to the mud which often coated the insects.

As Bueno (7, p. 138) has observed, *Nepa apiculata* "is found in quite shallow water, not much over two or three inches deep, concealed in the mud, or in situations where grasses grow out of the

water, clinging together." When raked out of the water together with the mud and partially decayed vegetation, these insects usually feign death, in which condition they readily escape detection, as their flat bodies are effectively concealed by the black mud and decaying plant tissue. It is only when the insects come out of the death feint and move about that they are usually seen, but even then one must watch closely, for their protective resemblance is remarkably good.

Fear.—A sudden approach towards an aquarium containing *Belostoma* recently brought into the laboratory sets them off from their resting places, fleeing in all directions. A large number of these hemiptera were placed in an aquarium containing bits of wood, such as pieces of shingles. Many of the water-bugs would crawl out of the water upon these floats, and upon our approach the insects would sometimes hurry to the edge of the board and plunge into the water with all the appearance of violent alarm. Specimens, which had not been disturbed over night, exhibited the same hurried movements to get to the bottom of the aquarium the next morning when approached by a large object, such as a black hat. Undoubtedly we may say from these outward appearances that *Belostoma* manifests fear.

Nepa apiculata, *Ranatra americana*¹ and *Ranatra kirkaldyi* show no sign of fear in its more usual manifestations.

Thigmotactic Response.—It was often noticed that *Belostoma* will crawl below objects lying on the bottom of the aquarium whenever possible. Large flat corks, four inches in diameter, were thrown into

¹ Mr. J. R. de la Torre Bueno has kindly called our attention to the fact that A. L. Montandon makes a new species of what we know as *Ranatra quadridentata*, viz., *Ranatra americana*, and synonymizes *Ranatra kirkaldyi* Bueno with *Ranatra fusca* P. B. Regarding these changes in nomenclature, Bueno wrote us as follows: "Montandon in his 'Notes sur quelques formes Nord-Américains du genre *Ranatra*,' Bull. de la Soc. de Sci. de Bucarest, Roumanie, XIX, p. 64, describes *R. americana*, which he identifies with what, following Uhler, we have been calling *quadridentata*, Stål; and he synonymizes my *R. kirkaldyi* with *fusca*, P. B. Montandon's method of identifying by a figure and not by a description, seems to me too far-fetched. As a matter of fact, I have in my collection two other species which can be identified with the description of *R. fusca*,—one from the South, and another local one, which I have also received from the West. To me, the question can best be resolved by determining where Beauvois got his examples. Until this is done, I much fear that I shall continue to regard my *kirkaldyi* as a distinct species and that *fusca* is still to be determined and fixed."

an aquarium in which the water was but an inch in depth, and within a few hours thirty-two of the thirty-five specimens that the aquarium contained were found beneath the corks. Again, it was not unusual to find two or more *Belostomas* or sometimes large clusters clinging together at the surface or bottom of the water, a characteristic which is also noticed with *Lethocerus* (= *Belostoma* Auct.) *americanum*, *Benacus griseus*, *Nepa apiculata*, *Ranatra americana* and *Ranatra kirkaldyi*. This habit is probably a manifestation of their thigmotactic response.

Food Reactions.—*Belostoma* is carnivorous. While resting at the surface-film of the water, it often seizes its prey with the front pair of raptorial legs. When in the resting position, the body extends obliquely down in the water, the posterior extremity of the abdomen being held slightly above the surface-film, while the front legs are held some distance below. In this attitude the front legs, slightly bent at the femoro-tibial joint, are extended forward on each side of the head; the femora of the middle and hind legs are extended outward at almost right angles to the long axis of the body, while the tibiæ of these legs form an obtuse angle with the femora. The front legs are thus in readiness to grab the prey, while the two posterior pairs are ever ready to propel the bug forward instantly at the slightest disturbance.

In procuring food, *Belostoma* does not depend entirely upon the sense of sight. We have often observed a back-swimmer or a water-boatman come to rest on the ventral surface of *Belostoma*, and were surprised at the number of times the prey escaped. If a back-swimmer or a water-boatman strikes against *Belostoma*, the latter makes a quick grab for it, and, if successful in capturing it, proceeds to suck out the juices. Often, however, a back-swimmer or a water-boatman is grabbed at as it passes near a *Belostoma* without coming in actual contact with it. Holmes (23, p. 160) finds that in the young of *Ranatra quadridentata*, "this action is probably a response to the impact of the water. If a *Ranatra* is hungry, touching the surface-film with a needle near the insect will often cause it to grab about wildly in the effort to seize whatever may have caused the disturbance." The same experiment was performed with a mature *Belostoma* which had been starved for a number of weeks, and so rapid was the reaction, that only the bug was observed clinging to the needle after the surface-film had been touched with it. Both eyes of a *Belostoma*

were now cut off, and shortly after the operation a honey-bee with vibrating wings was placed upon the surface-film near the bug, whereupon the latter responded by rapidly opening and closing the claw-like tibia and tarsus of the front legs. The next morning the surface-film near the aquatic bug was touched with a needle and the same reaction was given. By repeatedly touching the surface-film with a needle in front of this hemipteron deprived of its eyes, the bug could be induced to swim towards the needle and at the same time it would endeavor to grasp the source of disturbance.

Flies with one wing amputated were dropped near *Belostomas* resting at the surface of the water and were often seized so quickly and so suddenly that the eye was unable to follow the exact movements. If the bug was not hungry, however, the dipteran was able to swim about upon the surface-film within easy reach of the raptorial legs of *Belostoma* without provoking any attempt to capture the fly. If a fly, swimming on the surface of the water, happens to crawl upon this hemipteron, it may stimulate the bug to swim away, leaving the fly behind; or, if by chance, it reaches a position near the head of *Belostoma*, it may be seized by one of the raptorial legs. Should the fly be seized by one of its legs and endeavor to free itself, the other raptorial leg of the bug will often clutch the victim around the body. Bueno (10, p. 191) has observed that at times all three pairs of legs "are employed to hold fast some powerful insects or large victim, such as a snail." Having obtained a good grip, the water-bug draws the prey below its head to the beak. The fly may then be moved about by the raptorial legs as the terminal end of the proboscis touches the dipteran here and there, as if seeking a suitable place to insert the piercing organ. While holding the prey with its front legs, *Belostoma* proceeds to suck out the juices of its victim, and even when disturbed will usually not drop the fly, but will swim about very actively, retaining possession of its meal.

At times, a *Belostoma* resting at the surface-film, will leave its resting place without any apparent cause and begin to swim actively about. If the hemipteron should happen to swim to the bottom of the aquarium and by chance come to rest upon a dragon-fly nymph, not too large, the bug may again enjoy a meal; for as the nymph squirms about endeavoring to free itself of its burden, *Belostoma* may clutch it tightly and sink its styliform mandibles and maxillæ into its victim.

This predaceous water-bug feeds upon a variety of animals found in its environment. The aquatic insects most abundantly captured, as revealed in our aquaria, were the back-swimmers and water-boatmen. According to Weed's (39, pp. 11-12) observations, the most important element of food as noticed in his aquaria, "consisted of the larvæ and nymphs of dragon-flies (*Libellulidæ*). The next most abundant victim was the common undulating back-swimmer (*Noto-necta undulata*). . . . Univalve snails also occasionally contribute to the diet of this insatiable creature, as one was observed feeding upon a small snail with a spiral shell. May-fly larvæ (*Ephemeridæ*) also sucks out the juices of its own kind. On rare occasions we observed (10, p. 191), however, noticed that *Belostoma* often seizes and form part of its food, as was shown by similar observations." Bueno a mature form of this bug with its piercing organs penetrating the soft chitin and sucking out the juices of a *Belostoma* which had recently moulted and become full grown. While the older mature individuals will live together for a long time, rarely devouring one another, they will attack and suck out the juices of their own young. If young *Belostomas* of different sizes are placed in an aquarium, the smaller ones will be exterminated in a short time.

Nepa is also carnivorous. It will reach for its prey with its raptorial legs, but in no instance could this aquatic bug be induced to swim or run after its prey. If a house-fly or a dragon-fly nymph is carefully and slowly brought towards the front legs, the claw-like tibiae and tarsi slowly move away from the femora. If they are already extended and well separated, as is often the case, the insect usually remains perfectly quiet until the prey is actually placed between the outstretched legs, when suddenly it is seized and securely held. The piercing-organs are then inserted into a soft part of the body and the insect begins to feed. It will also grasp the tip of a pencil when this is slowly and carefully placed between the outstretched front legs. If, however, a fly, dragon-fly nymph or a pencil is quickly and suddenly presented to the hemipteron, it will usually draw back its front legs, folding the tibia and tarsus back into the groove of the femur.

Nepa will not only use smaller animals than itself as food, but it will also feed upon dragon-fly nymphs considerably larger and

stronger than itself, the struggles of the dragon-fly nymphs usually ceasing within a short time after the piercing organs of a *Nepa* have been pushed into their bodies. That this is the effect of a fluid which *Nepa* injects into them was only too well demonstrated on ourselves. While one of us was carelessly holding several *Nepas* in a closed hand, one of the insects suddenly punctured the palm, causing an intense pain and soon afterward a considerable swelling. Locy (32, pp. 355-6) has found in the genera *Lethocerus*, *Belostoma* and *Ranatra* what he calls the "cephalic glands," which may be the source of a poisonous secretion. "When these insects are irritated, a secretion is freely thrown out around the base of the beak, which produces death very quickly when introduced on a needle point into the body of an insect."

Respiration.—*Belostoma* will often leave its resting place in the water and swim to the surface to obtain a fresh supply of air. During this respiratory act, one may notice a pair of strap-like appendages protruding above the surface-film from the posterior end of the abdomen; within a short time these are retracted and usually withdrawn from sight. If the wings of this aquatic bug are raised while the insect is below the surface of the water, a silvery coating of air will be noticed on the dorsal side of the abdomen. Unquestionably *Belostoma* carries a reserve supply of air between the wings and the abdomen. If a specimen emerged in water is examined under a binocular microscope, one can readily see that the pubescence described by Bueno (10, p. 192) on the under surface of the body holds a thin film of air, which probably supplies the abdominal and thoracic spiracles.

Uhler (27, p. 255) in writing of the family Belostomatidae says: "A remarkable feature of all the genera is in the presence of a pair of flattened, narrow, strap-like appendages at the end of the body which are extensible, but not concerned with respiration . . ." Bueno (10, p. 192), however, found near the base and below the outer edge of each strap-like appendage in *Belostoma flumineum*, "a deep sunk orifice in which lies the great spiracle from which springs the large tracheal trunk of the main system."

When *Belostomas* are disturbed while taking in a new supply of air, some specimens will spurt forth, on rare occasions, a stream of

liquid material from the caudal end of the abdomen. Occasionally an individual will do the same thing when taken suddenly out of the aquarium. For a long time we were under the impression that water had accumulated beneath the wings and that this was forcibly ejected in some way. Recently a *Lethocerus americanum* was suddenly taken out of the water and it also spurted forth a stream of liquid, which happened to strike the nose of one of us and, from the peculiar odor, we concluded that the ejection of the stream is due to a forcible discharge of the contents of the rectum.

A number of experiments were performed in order to determine the length of time *Belostoma* and *Ranatra* can remain alive below the surface of the water. Ten specimens of *Belostoma flumineum*, ten *Ranatra americana* and ten *R. kirkaldyi* were placed in a cage ($7 \times 10 \times 5$ inches) made of wire gauze and this was then completely emersed in water so that it was two inches below the surface-film. The temperature of the water was 20° C. and of the atmosphere 23° C. In these experiments it was found that *Belostoma* and the two species of *Ranatra* died, on an average, within twelve hours. This result, however, would probably vary with the general activity of the aquatic bugs and the temperature of the water, since in the winter time, when the water is coated with ice, *Belostomas* and *Ranatras* are unable to come to the surface of the water to get a fresh supply of air.

If *Nepas* are allowed to remain in a jar of water, containing no vegetation or anything upon which they can crawl to the surface, they will all sooner or later be drowned. We have kept *Nepas* alive three months in a flat dish with water in it, shallow enough for the insects to reach the surface with their breathing tube, by feeding them now and then with house-flies and dragon-fly nymphs.

Methods of Progression.—Packard (35, p. 158), Kirkaldy (28, p. 344 and 29, p. 154), Bueno (9, p. 53 and 12, pp. 1-4) and Brimley (1, p. 88) have all discussed the method of progression of various aquatic-bugs, and Bueno (12, pp. 2-3) has made a detailed study of the method of swimming in *Belostoma flumineum*.

While *Belostoma* can swim with exceeding rapidity, *Nepa* makes but slow progress in water. *Belostoma*, *Lethocerus*, *Benacus*, *Nepa* and *Ranatra* alternate the movements of the hind pair of legs with

the middle pair in swimming; the front legs play no part in this method of progression, for they are extended forward on each side of the head, ready to seize an object upon which to come to rest.

In locomotion on land, however, the legs move in an entirely different manner from what they do in swimming. *Belostoma* and *Nepa* use all the legs in walking. In crawling, *Belostoma* alternates the movement of the hind legs, as well as the middle legs, but in swimming each pair of these legs moves simultaneously. Brimley (1, p. 88) claims that *Benacus griseus* while crawling, moves the hind legs together at first, "and afterwards when he got used to the situation, alternately . . ." When *Ranatra americana* is taken out of the water and is not thrown into the death feint it may, at first, give the typical swimming movement, but later, the posterior pairs of legs move as in *Belostoma*.

Belostoma can occasionally be induced to take wing by a number of different methods. In one experiment fifteen of these bugs were taken out of the water, which was at 19° C., and exposed for one and a half hours to the temperature of the atmosphere at 21° to 23° C., when two specimens made eager efforts to escape by flying against the sides of the dish in which they were confined. While working on the effect that sunlight may have on the duration of the death feint, it was found that *Belostoma* sometimes takes wing after coming out of the inert state. A method which rarely fails to induce *Belostoma* or *Ranatra* to fly is to arouse the creature's phototactic reactions by means of an artificial light. Although *Nepa* is without doubt able to fly, in no case have we succeeded in making it take wing.

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THE RESURRECTION OF *THYANTA CALCEATA* SAY FROM SYNONYMY.

BY H. G. BARBER,

ROSELLE PARK, N. J.

Professor E. B. Wilson, of Columbia University, in his researches concerning the chromosomes of the germ cells of the species of *Thyanta* frequenting the eastern United States, came to the conclusion, from certain constant differences in the chromosomes, that there were two distinct, but closely related species of this genus which have hitherto been incorporated under *Thyanta custator* Fabr.¹ He turned all of his specimens over to me, including four specimens of *T. perditor* Fabr. from Jamaica, W. I., with the request that I work out the differentiation of the two species. At the same time Professor Wilson pointed out to me certain differences in the shape of the scutellum by which alone he was able to separate the two species.

Since receiving this material I have endeavored to gather speci-

¹ Professor Wilson states in his paper before the Seventh International Congress in 1907, printed 1909, that he is readily able to differentiate the two species from a microscopical examination of their germ cells, as *T. calceata* has 27 chromosomes in the male and 28 in the female, while *T. custator* has 16 chromosomes in both sexes.

mens of this genus from various parts of the United States and I have spent much time and studied several hundred specimens in the endeavor to characterize the two confused species. But although I can pick them out easily, from a difference in their general shape, I have found it difficult to fix upon well marked constant structural characters which will always serve to differentiate them.

There is no doubt that the *Thyanta custator* Fabr. is a very plastic, variable and widely distributed species while the other species which has been confused with it, is more restricted in its distribution and more constant in its characters. *T. custator* described by Fabricius from Carolina (Syst. Rhyng., 164, 1803) occurs all over the United States south of New York and becomes abundant in the South and in the West, where it is subject to much more variation than our eastern specimens. In the West, more rarely in the southeastern United States, this species has the humeral angles frequently spinose and varies much in color, ranging from green through testaceous to rufescent as in the Lakehurst, N. J., specimens. The purple-red pronotal band is subject to much variation, being absent entirely or very conspicuous, with the humeral angles, costal margins of corium and apex of scutellum frequently reddish. Furthermore, the western specimens are inclined to be less hairy or setose. There is little doubt, in my mind, that it is specimens of this species with the spinous humeral angles which have been referred to by systematists in this

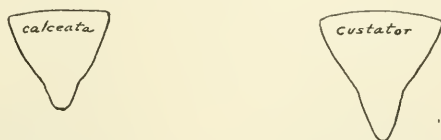


Fig. 1. Scutellum of *Thyanta calceata* and that of *Th. custator*.

country as *Thyanta perditor* Fabr., which species I believe does not occur within the limits of the United States either in the southeast or southwest.

After a careful comparison of specimens with the descriptions I am convinced that the other species of *Thyanta* referred to as occurring in the eastern United States and which has been so long sunk in synonymy is *T. calceata* Say, the type of which is not in existence,

as that author mentions in his description one of its most prominent and constant characters, viz., the black lateral edge of the pronotum and the purple-red pronotal band as well as a few minor characteristics. Moreover, Herrick-Schaeffer's description and figure of *T. custator* Fabr. pertains without doubt to *T. calceata* Say, so it should be placed as a synonym of that species and the arrangement should be as follows:

Thyanta custator Fabr., Syst. Rhyng., 164, 1803.

Thyanta calceata Say, Hem. New Harm. Ind., 765, 1831. Syn.

Thyanta custator Fabr. Herrick-Schaeffer, Wanz. Ins., VII, 96, 106, fig. 771, 1844.

Thyanta calceata Say is uniformly smaller and proportionately shorter than *T. custator*, subshining and uniformly dark green in all of the mature specimens I have seen. The lateral edge of the prothorax is always narrowly black and with an almost constant, conspicuous, purple-red band between the humeral angles on the dorsal surface of the pronotum. The scutellum, as shown in Fig. 1, is relatively shorter in this species and the narrow apical portion not so attenuated as in *T. custator* and concolorous. The lateral margins of head, pronotum, abdomen and the legs less setose. The second and third joints of the antennae subequal in length, with the first two joints pale green, third and base of fourth segment rufous and the apex of fourth and fifth infuscated. The two black points are more or less evident in the cicatrix of the pronotum. The membrane is frequently without fuscous spots, similarly to *T. custator*.

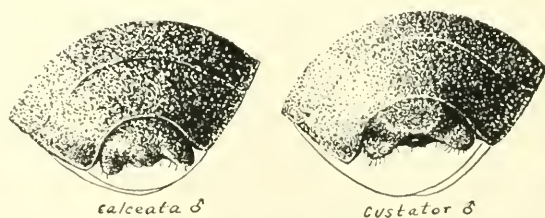


Fig. 2. Posterior segments of male *Thyanta calceata* and *Th. custator*.

The genital segment of the male, as shown in Fig. 2, is proportionately narrower, more convex ventrally and with the two lateral lobes not so divergent internally, apically more rounded and with

the ventral surface of these lobes less pinched in or appressed; the sinus between them narrower and the slightly notched central lobe more prominent as viewed ventro-posteriorly as it is more sharply convexed.

T. calceata Say seems to be confined to the territory east of the Appalachians, and judging from the localities from which I have seen material, appears to be more characteristic of the highlands and mountainous districts, while *T. custator*, at least in the East, occurs more in the low lands.

Professor Wilson has collected *calceata* at Madison, N. J., where it is fairly common in the fall, Black Mt. and Southern Pines, N. C. Professor W. E. Britton has loaned me a specimen taken at New Canaan, Conn., which is the farthest north from which I have any record, although Professor Uhler has reported *T. custator* which is probably *calceata* in the Harris Collection from Cambridge, Mass. In my own collection are specimens from Madison, N. J., and Cold Spring Harbor, Long Island.

T. custator ranges across the United States from New York in the North and Florida in the South to Oregon, California and the Southwest. I have not seen specimens from northern New York or New England. Professor Wilson has this species from Southern Pines and Black Mt., N. C., Savannah, Ga., Memphis, Tenn., Colorado and Arizona. One specimen from Black Mt. has the humeral angles spinose. I have this species from Lakehurst, N. J., the northernmost point in my records, Thomasville, Ga., Enterprise and Leon, Fla., Pass Christian, Miss and from various points in the West where it is more abundant, as Dakota, western Nebraska, Missouri, Texas, Arizona, California and Oregon.

PYRRHOCORIS APTERUS LINN. IN THE UNITED STATES.

BY H. G. BARBER,

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Pyrrhocoris apterus Linn. has a wide range in the old world. In 1883 Mr. W. L. Distant, in the Biol. Cent. Amer., p. 414, states:

"This species was included in our fauna on the authority of several specimens labelled 'Costa Rica—Van Patten.' We have, however, received no further confirmation of its presence in Central America from any other of the collections subsequently received." This is the first and only report hitherto of the occurrence of this species in the new world. I was therefore considerably surprised to find two typical male specimens of this species in the collection of Dr. E. G. Love, of New York City, labelled Snake Hill, N. J., April 26, 1896. Snake Hill, only a few miles from New York City, is rather a large rocky, wooded hill which rises rather abruptly in the midst of the "Jersey Meadows," formerly, a famous collecting ground but now rather difficult of access, as it is occupied by various state or county institutions.

Knowing the systematic care with which Dr. Love handles his entomological material I am not inclined to doubt the authenticity of his records. Furthermore, Dr. Love has informed me that he had not up to that time received any material from Europe with which he might have confused his own collections. I am not able to explain how these specimens made their appearance in New Jersey.

NOTEWORTHY HEMIPTERA COLLECTED ON LONG ISLAND, N. Y.

BY WM. T. DAVIS.

NEW BRIGHTON, STATEN I., N. Y.

A casual inspection of the soil and flora of Long Island, N. Y., would suggest to an entomologist the probability of finding many southern insects, especially on the south side in the belt of pines. My search in this direction was rewarded during 1910 by finding five species of hemiptera which are usually more common to the south of New York, and which it may be well to record from Long Island.

1. *Apiomerus crassipes* Fabr.—Three specimens were taken in the Half Way Hollow Hills in July in an old field now overgrown with daisies, *Rudbeckia*, etc. One was on the flower of a wild rose and had just captured a small bee. The fore parts of the *Apiomerus*

were heavily covered with pollen, the stiff hairs retaining a considerable amount. While we do not usually think of a predaceous bug as instrumental in the crossfertilization of plants, yet this individual could have been useful to the rose if it chanced to visit other flowers.

2. *Lygaeus bicrucis* Say.—While this insect has a wide range it is quite uncommon in the vicinity of New York City. A single specimen was captured in the Half Way Hollow Hills, July 4, on a small poplar.

3. *Largus succinctus* Linn.—This southern bug was found running among the dead leaves in a woods at Christian Hook, May 10, 1910.

4. *Nezara pennsylvanica* De Geer.—Found near Swan Pond, between Calverton and Manorville, Sept. 28, 1910.

5. *Tetyra bipunctata* H. S.—This is usually considered to be a southern species, but has been recently found on Long Island by several members of the New York Entomological Society. Mr. Geo. P. Engelhardt and I took a considerable number of specimens on the pitch pines at Promised Land near Montauk. This brings the known distribution of the species a considerable number of miles further to the northeast, and to the last forest of pines on Long Island. This bug has a stridulating apparatus in the form of two striated areas on the under surface of the fourth and fifth segments of the abdomen, and when the legs are rubbed against these file-like structures, the insect makes considerable noise.

NEW COLEOPTERA AND MISCELLANEOUS NOTES.

BY CHARLES SCHAEFFER,

BROOKLYN, N. Y.

Family CARABIDÆ.

Calosoma rugosipennis, new species.

Black, without distinct golden spots. Head moderately densely punctate and feebly rugose. Prothorax in its widest part narrower than the elytra at base; base and apex equal; sides subangulately rounded; lateral margin narrowly reflexed; basal margin feebly arcuate and sinuate near the angles; hind

angles obtusely rounded; surface rugose, very coarsely so along basal margin; near lateral and apical margins a few coarse punctures. Elytra about one-third longer than wide at base; sides nearly parallel; striæ distinctly impressed near base but gradually finer towards apex, striæ not punctate; surface rugose, rather coarsely at about basal third, finer and almost obsolete towards apex. Anterior tarsi of male with joints one to three hairy beneath. Length 19.5 mm.

California.

There is a faint indication of two metallic dorsal spots at sides in the single specimen, which is very old, and in my collection for a number of years. Fresh specimens may perhaps show a few more evident metallic spots.

The rather short, rugose elytra and the small size will readily distinguish this odd little species which seems to be allied to *ercmicola* Fall, but the short description does not fit my specimen very well.

Anisodactylus lodingi, new species.

Black, elytra opaque. Clypeus on each side with one setigerous puncture. Prothorax at base narrower than elytra; apical and basal margins nearly equal; sides arcuate; hind angles obtuse and rounded; lateral margin rather widely depressed and densely punctulate; basal foveæ large; disk almost smooth, near apical margin finely punctate, more coarsely along basal margin. Elytra without dorsal puncture; feebly arcuate at sides; striæ impressed but not punctate; intervals convex, not punctulate. Mentum rotundate-emarginate; ligula and paraglossæ as in typical *Anisodactylus*. Terminal spur of anterior tibia dilated at middle. First four joints of anterior and second to fourth joints of middle tarsi of the male dilated and spongy pubescent beneath, first joint of middle tarsi feebly dilated and spongy pubescent beneath in about apical half. Posterior tarsi slender. Length 18-19.5 mm.

Mobile, Alabama.

The females differ from the males, besides as usual, in having a much larger head and seemingly slightly narrower thorax.

Following Dr. Horn's table¹ this species has to be placed near *furvus*, from which it differs in being much larger and more robust and having a different form of thorax.

It is with pleasure that I name this interesting new species after its discoverer Mr. H. P. Loding, of Mobile, Alabama.

Family MONCEIDIDÆ.

Monadus Lec., Trans. Am. Ent. Soc., Vol. X, p. 116.

Adimerus Sharp, Biol. Cent. Am., Vol. II, pt. 1, p. 441.

¹ Trans. Am. Phil. Soc., vol. XIX, p. 162.

The genus *Adimerus* was erected by Dr. Sharp for a few small Central American clavicorn beetles allied to the Colydiidae but differing principally from these and from the rest of the *Clavicornia* by the peculiar formation of the first joint of tarsi. This first joint is broadly dilated, the second joint is inserted on the upper side of the base of the first joint, and both the second and third joints, which are very small, are invisible on the ventral aspect.

This tarsal structure as well as the other characters given by Dr. Sharp for the genus *Adimerus*, are the same as in *Monædus guttatus* Lec. Therefore, *Monædus*, as the older name, has priority over *Adimerus*, and the family will be known as Monædidae.

Family NITIDULIDÆ.

Carpophilus californicus, new species.

Related to *niger* but less robust and convex; elytra unimpressed below scutellum; punctuation of head and thorax less dense; lateral margin of thorax very narrowly reflexed; last ventral segment of the male on each side of the emargination broadly, shallowly impressed; last dorsal segment of female with a deep apical impression, the surface above the depression convex. The color is black or piceous; intermediate antennal joints, legs and lateral margins of thorax pale; elytra rufous with suture, apex and a little more than half of the lateral margin black or piceous. Length 4-4.5 mm.

Tulare County, California.

A single pair in the Dietz Collection, which differ sufficiently from eastern specimens of *niger* to receive a name.

Carpophilus rufiventris, new species.

Elongate oval, depressed; color piceous, underside rufous, legs and antennæ, except club, paler; upper surface feebly shining, clothed moderately with dark pubescence. Head moderately coarsely and closely punctate. Prothorax with basal and apical margin nearly equal; sides feebly arcuate; anterior angles broadly rounded; basal angles distinct, oblique not reflexed; punctuation moderately coarse, punctures on the disk distinctly separated. Elytra more sparsely punctate than the prothorax. Propygidium and pygidium more densely and slightly more finely punctured than the elytra. Fifth ventral segment of the male deeply, circularly emarginate, without impressions, anal segment ventral. Length 5-5.5 mm.

Huachuca Mts., Arizona.

As usual the color is variable. In the fully colored specimens the color is black with lateral margin of thorax rufotestaceous, the

underside is piceous, but the abdomen is always rufous, especially at middle, and the legs are always paler.

It belongs to Sharp's group § 2.¹

Carpophilus deflexus Sharp, Biol. Cent. Am. Col., Vol. II, pt. 1, p. 290.

I have two females from the Huachuca Mts., Arizona, which I refer doubtfully to this species.

Carpophilus ignobilis Fall, Trans. Am. Ent. Soc., Vol. XXXVI, p. 124.

A few specimens taken by me in the Huachuca Mts., Arizona, which I had identified as *lacertosus* Murray, agree also with Fall's description of *ignobilis*. The two may be the same, but a comparison of typical examples will be necessary to settle this point.

Conotelus punctatus, new species.

Piceous, clytra brown, legs and antennæ pale, very sparsely pubescent. Prothorax as in *obscurus*, but surface distinctly punctate. Elytra finely granulate, the rows of punctures distinct. Abdomen not acutely margined, sparsely punctate. Length 3.5 mm.

Lake Worth, Fla. (O. Dietz.)

This species is closely allied to *obscurus* from which it is distinguished by the rather distinct punctuation of prothorax and elytra, the very sparse pubescence of upper surface and the different form of mesosternum, which is not deflexed in front as in *obscurus* but plane.

Nitidula nigra, new species.

Oblong-oval, black, rather shining, sparsely pubescent, legs piceous. Prothorax nearly twice as wide as long; apex narrower than base; lateral margin reflexed; sides feebly arcuate and rather more strongly narrowing to base a little above the basal angles; surface moderately coarsely and not densely punctured at middle, with some finer punctures intermixed. Elytra finely not densely punctured. Prosternum moderately densely punctured at middle. Abdomen densely punctate. Length 4 mm.

Alaska.

The single specimen in my collection from which the above description is drawn was sent me a few years ago by my brother without more definite locality.

This species is closely allied to *rufipes* but differs in being black, with shining surface, prothorax narrower at apex with lateral margin more reflexed and relatively more sparsely punctate, especially at

¹ Biol. Cent. Am. Col., Vol. II, pt. 1, p. 288.

middle. In *rufipes* there is a more or less distinct, longitudinal impressed line near lateral margin which is absent in *nigra*.

***Pocadius basalis*, new species.**

Piceous, elytra with a red, somewhat triangular basal space, underside ferruginous, legs and antennæ paler. Head coarsely punctured. Prothorax about twice as wide as long; sides moderately arcuate; lateral margin feebly explanate; hind angles oblique; disc rather coarsely but not very densely punctured. Elytral rows of punctures confused near suture, more distinct at sides. Prosternum, seen from the side, plane not deflected at apex. Mesosternum subcarinate at middle. Metasternum coarsely punctate. The first few segments less coarsely punctate than the last. Length 4 mm.

Huachuca Mts., Arizona.

This species looks very much like *fulvipennis* but has the prosternum differently formed, the sides of the thorax feebly explanate and the punctuation of elytra confused.

The prosternum, viewed laterally, is relatively strongly arcuate in *fulvipennis*, less so in *helvolus* but plane in *basalis*.

TABLE OF THE SPECIES OF *Pocadius*.

- | | |
|---|------------------------|
| 1. Prosternum, viewed laterally, plane not deflexed behind the coxæ; mesosternum longitudinally carinate at middle; sides of thorax slightly more reflexed than in <i>helvolus</i> but less so than in <i>fulvipennis</i> ; color piceous, elytra with a red basal spot of variable size..... | <i>basalis</i> n. sp. |
| Prosternum at apex more or less deflexed | 2 |
| 2. Prosternum feebly deflexed behind the coxæ, mesosternum longitudinally acute at middle; sides of thorax and elytra feebly reflexed; color rufo-testaceous | <i>helvolus</i> Er. |
| Prosternum strongly declivous behind the coxæ; mesosternum plain, not acute at middle; sides of thorax and elytra rather strongly reflexed; color variable, from rufo-testaceous to black, elytra with large, rufous basal space | <i>fulvipennis</i> Er. |

***Psilopyga nigripennis* Lec., New Species, 1863, p. 64.**

Dr. Horn suggested that this might prove to be a variety of *histrina*. The characters separating the two are too numerous to admit such a course. Besides those given in the following table of our species the prosternum in *nigripennis* is more convex, the third and fifth antennal joints are relatively longer and the metasternum and abdomen are much more sparsely punctate than in *histrina*.

TABLE OF THE SPECIES OF *Psilopyga*.

- | |
|--|
| 1. Head and prothorax, the latter especially near margin with fine and coarse punctures intermixed; prosternum uniformly, rather coarsely punctate |
|--|

- over the entire surface; elytral intervals, especially at basal half with confused punctuation; color uniformly black..... *histrina* Lec.
 Head and prothorax with uniform punctuation 2
 2. Prosternum almost smooth, near apical margin a row of very coarse and deeply impressed punctures; intervals with a single row of punctures; color red, elytra black..... *nigripennis* Lec.
 Prosternum equally punctate over the entire surface; elytral intervals at basal half with confused punctuation; color black or piceous, elytra with large, red basal space..... *fasciata* Sharp.

Rhizopagus robustus, new species.

Differs from *sculpturatus* in slightly longer and broader thorax with sides scarcely narrowed towards base, longer third antennal joint and the more deeply impressed elytral striae. Length 4 mm.

Kentucky.

I have also a specimen of this species taken years ago on Long Island, N. Y.

Family DRYOPIDÆ.

I have followed recent European catalogues and publications in using *Dryops* for the species formerly known as *Parnus*, *Helichus* for what we have called *Dryops* and *Helmis* for *Elmis*.

In part 17 of the "Coleopterorum Catalogus" Zaitzev has placed our North American species of *Elmis* in the two genera *Helmis* and *Limnius*. As far as I know our species they do not fit in any of the European genera proposed at the expense of *Elmis*. *Elmis glaber* Horn is very close to *Heterelmis obscurus* Sharp from Guatemala and has to be placed with *latiusculus* and *nitidulus* in the genus *Heterelmis*, and *Elmis mastus* Horn, judging from the description, seems to belong in the genus *Elsianus* Sharp. For the rest of our species, if we follow the European custom, three new genera at least have to be erected and perhaps more.

Phanocerus clavicornis Sharp, Biol. Cent. Am. Col., Vol. I, pt. 2, p. 129.

Specimens collected at Devil's River, Texas, by F. C. Pratt are in the collection of the United States National Museum which agree with the description of this species.

The genus is a member of the tribe Potamophilini (Larini Lec.) and is readily distinguished by its short antennæ with the last six joints forming a compact oval club.

Among the material kindly sent me by Messrs. Schwarz and

Barber was an apparently new species of this genus from Jamaica, West Indies.

***Phanocerus hubbardi*, new species.**

Oblong-elongate, fuscous, prothorax and elytra densely clothed with short pubescence. Prothorax narrowing from slightly behind middle to apex, sides sinuate behind middle; hind angles acute; front angles rounded; disk slightly convex, with faint longitudinal median impression; at middle of base two, round punctures and above this an elongate puncture; on each side near the lateral margin a short, straight, linear impression; the usual subapical lateral impression feeble. Elytra wider than the prothorax; punctures of striae in about apical half small and very faint. Length 2.75 mm.

Jamaica, West Indies (H. G. Hubbard), in the collection of the U. S. Nat. Museum.

This species resembles *P. clavicornis* Sharp very closely but is slightly smaller, less convex, thorax with feeble subapical lateral impression and the series of elytral punctures almost obliterated in about apical half.

***Esianus texanus*, new species.**

Elongate, black, legs, antennae, palpi and last abdominal segment rufous, surface clothed sparsely with short, stiff, recumbent pale hairs. Head obsoletely granulate. Prothorax slightly wider than long; sides slightly arcuate and feebly sinuate before the hind angles; apex slightly narrower than base; apical margin broadly arcuate, deeply sinuate on each side in front of eyes, apical angles produced, lateral margin crenate; basal margin bisinuate; slightly emarginate before the scutellum; surface granulate, the granules very fine and obsolete near apex; median longitudinal line distinctly impressed in basal half; lateral carina almost entire. Scutellum small, rounded, acute at apex, sparsely granulate. Elytra at base slightly wider than the thorax at base; about one-third longer than wide at base; lateral margin crenate; disc with distinctly impressed striae, striae with coarse, shallow punctures, the lateral striae faintly impressed, intervals feebly convex, with small, not closely placed granules, which are obsolete at middle of disk. Underside somewhat densely covered with rather larger granules than upperside; laterally densely clothed with short, pale, silken pubescence. Front and middle tibiae inside with an elongate, densely pubescent space. Length 4.75 mm.

Devil's River, Texas.

A single specimen in the collection of the U. S. National Museum.

This species is allied to *robustus* Sharp from Guatemala, but seems to differ in being black, of narrower form, the striae with large punctures and the surface clothed sparsely with short, stiff, recumbent hairs.

The genus *Elsianus* is a member of the subfamily Helminæ (Elminæ) separated by Dr. Sharp from the genus *Elmis* and its nearest allies by the mesosternal groove being limited anteriorly by two distinct raised lines and the longer maxillary palpi.

***Helmis ornatus*, new species.**

Oval, black, underside and legs pale; elytra with large transverse humeral and ante-apical pale spot.

Prothorax broad, gradually arcuately narrowing to apex; apical and basal angles acute; disk on each side with two longitudinal carinæ of which the outer one is short and the inner one long, reaching from base to very near the apical margin, surface finely punctate. Elytra at base scarcely wider than the thorax at base, sides arcuate; stria punctures distinctly impressed; intervals feebly convex and finely punctate; surface feebly pubescent. Length 2 mm.

Montana.

From our similarly marked oval species this new species will be readily known by the entire inner thoracic stria or carina and from those possessing an entire stria by its oval form and ornate elytra.

Family LAMPYRIDÆ.

***Rhyncheros sanguinipennis* Say**, Journ. Acad. Nat. Sci. Phil., III, p. 178, 1823.

The figure of *Lycostomus lincicollis* Chev. in Biologia Cent. Am. Col., Vol. III, pt. 2, pl. 1, fig. 4, and the description agree very closely with Say's species and I have very little doubt that the two are the same.

Gorham, in treating the Central American species in the Biologia, does not mention the genus *Rhyncheros*, which is, in my opinion, not well founded, as most of the species of *Lycostomus* in our list have a more or less short beak.

***Lycostomus femoratus*, new species.**

Resembles in coloration and form *fulvellus* Lcc. but differs in having less arcuate hind tibiæ, femora in great part yellow and only near apex black; median thoracic spot much smaller, the thorax wider and more distinctly trisinate in front, alternate elytral costæ distinctly more elevated than the others especially in apical half. Length 14 mm.

Huachuca Mts., Arizona.

This is the species I reported in my list of Lampyridæ from the Huachuca Mts., Arizona¹ as *fulvellus* but having seen lately Colo-

¹ Journ. N. Y. Ent. Soc., vol. XVI, p. 62.

rado specimens of that species, the difference between the two was quite obvious.

Lycostomus simulans, new species.

Resembles very closely in form and color *loripes*, from which it differs in having a much shorter beak and shorter and wider last joint of maxillary palpi. Length 11 mm.

Huachuca Mts., Arizona.

This species is so very much like *loripes* that it is very likely mixed in collections with that species. Only two of our species, *latralis* and *loripes*, have a narrower, elongate beak, which especially is very long and narrow in *loripes*, the rest of our species, including *simulans*, have a much shorter and broader beak.

Lycostomus tabidus Gorh., Biol. Cent. Am. Col., Vol. III, pt. 2, p. 4.

As far as the description goes this species seems to be very close to *L. fulvellus* Lec.

Eros nigripes, new species.

Black, elytra and lateral and apical margins of thorax red. Prothorax with five well-defined cells, the median one finely carinate. Antennæ about half as long as the body, third joint shorter than fourth; second and third joints together about as long as fourth. Hind trochanters short. Length 7 mm.

Minnesota.

A single pair in collection of Dietz, of which the female differs from the above described male as usual in shorter and stouter antennal joints.

Family CLERIDÆ.

Monophylla ruficollis, new species.

Black upper and under side of prothorax and abdomen, except last segment red. Head densely punctate; antennæ ten-jointed, last joint of female about as long as the preceding four or five joints. Form of thorax as in *terminata*, surface very sparsely punctate on the disk but coarsely and densely punctate near apical margin, near lateral margins almost impunctate. Elytra clothed with cinereous pubescence, sculpture, below basal third, somewhat granulate rugose, obliterating the punctuation, which is rather fine and sparse and only plainly visible near base. Length 7 mm.

Arizona.

I had regarded the single specimen, a female in my collection, as a color variety of *terminata*, but a closer examination shows that it

differs from that species in the relative length of the last antennal joint and the different punctuation and sculpture of prothorax and elytra. The thorax is clear red without spot and the elytra is black throughout, though there is at about middle of lateral margin a small indefinite space of dark brownish color, suggesting the possibility that specimens may occur with a pale lateral spot as in the other species.

Mr. Wolcott in Publ. Field Mus. Nat. Hist., Zool. ser., Vol. VII, p. 341, places *pallipes* as a synonym of *californica* with the following remarks: "specimens of *californica* in the author's collection from Brownsville, Texas, agree in every detail with the brief description of the recently described variety *pallipes*, the type of which is also from Brownsville, Texas, hence they are united."

As far as his specimens are concerned the remarks are correct, but he made the mistake of wrongly identifying his Brownsville specimens as *californica*. In regard to coloration both *pallipes* and *californica* are very similar but differ decidedly in the number and shape of the antennal joints, especially in the female. Fall in his description calls attention to the difference in the number of antennal joints of *terminata* and *californica*, and Wolcott, in the publication cited, p. 342, remarks under *terminata* that the antennal joints of the males of *californica* and *substriata* are eight-jointed and ten-jointed in *terminata*, but Wolcott never took the trouble to examine the antennal joints of his Brownsville specimens, simply identifying it as *californica* on the similarity of coloration. The antennal joints in *pallipes* are very distinctly ten-jointed in both sexes, while in *californica* the antennae are nine-jointed at least in the female and possibly in the male also. I did not care to handle very much the only two small male specimens before me, of which one belongs to Mr. Fall, but there seem to be four small joints between the second and the last three joints. The four or five antennal joints preceding the last are gradually enlarged in *ruficollis*, *terminata* and *pallipes*, while in *californica* only the two joints preceding the last are enlarged and very abruptly so.

I described *pallipes* as a variety of *terminata*, but I am convinced now since seeing more material of the three species, that it is entitled to specific standing.

In regard to coloration, the few specimens of *californica* which I

have seen, including three specimens kindly sent me by Mr. Fall for comparison, are very variable, some specimens have black elytra with pale lateral spot, others have apex and part of suture ferruginous and sometimes the base also; one specimen has an elongate ferruginous subapical heart-shaped sutural spot, the pale lateral spot is also very variable in size.

In one male kindly sent me by Mr. Fall the elytra shows very plainly near suture two longer impressed striæ and one shorter, and the black triangular lateral spots of the abdomen extend almost across the base of each segment, other specimens show a faint indication of one or two striæ near suture. In two specimens of *pallipes* there is also a faint indication of two or three striæ near suture. Wolcott described *substriata* and separated it from the rest of the species on the possession of two or three striæ near suture and the dark abdomen. As shown above, this occurs in *californica* also and if there are no other characters to separate the two *substriata* has to be united with *californica*.

Substriata Wolc. is not included in the following table, as I could not find in the description a good character to include it in the following table:¹

TABLE OF THE SPECIES OF *Monophylla*.

1. Elytra black, granulate rugose, the punctuation nearly obliterated and only visible at basal third; prothorax unicolorous red, punctuation coarse and dense at apical margin, fine and very sparse at middle of disk; last antennal joint of female about as long as the four preceding joints.

ruficollis n. sp.

- | | |
|--|---|
| Elytra distinctly punctate from base to apex | 2 |
| 2. Antennæ of female ten-jointed | 3 |
| Antennæ of female nine-jointed | 4 |
| 3. Prothorax black, elytra brownish with a more or less distinct transverse pale spot at middle of lateral margin; femora black, tibiæ generally pale; | |

¹ Through the kindness of Prof. Wickham I received the type of *M. substriata* Wolc. in time to add a note on the species.

M. substriata Wolc. is, as I suspected, the same as *californica* Fall. The thorax in *substriata* is not densely but sparsely punctate and much less rugose than in the five specimens of *californica* before me, but these, however, show enough variation in this respect to indicate that the two cannot be separated on the sculpture of thorax. The abdomen in Wolcott's type is a little compressed, but the black or piceous spots at sides can be plainly seen. The sub-sutural striæ are said to be punctate-striate, which is not the case, they are feebly impressed and cannot be seen in certain light.

- last joint of antennal club of female about as long as the preceding four joints *pallipes* Schaeff.
 Prothorax red with a central black spot of variable size; elytra black with side margin in about basal half and lateral transverse spot pale, last antennal joint of female as long or almost as long as the eight preceding joints *terminata* Spin.
 4. Prothorax black with apical margin more or less reddish, elytra with lateral pale spot and sometimes with sub-apical pale sutural spot; femora black, tibiae pale, last antennal joints of female as long or almost as long as the preceding joints *californica* Fall.

Family CERAMBYCIDÆ.

***Metaleptus femoratus* Schaeff.**, Bull. Brooklyn Inst. Mus., Vol. I, p. 384.

Metaleptus gracilis Fall., Can. Ent., Vol. XLI, p. 164.

Both names refer to the same species. The description of *M. gracilis* Fall appeared a few days later than that of *M. femoratus* Schaeff.

***Calloides nobilis* var. *mormonus*, new variety.**

Head with two transverse fasciae of dense yellow pubescence, one above the eyes and one below. Elytra with heavy basal fascia of dense yellow pubescence, a short oblique fascia below this which does not attain suture nor lateral margin; between this and the basal fascia at lateral margin an elongate spot, below middle a slightly arcuate, internally sinuate fascia from lateral margin to suture; below this a more sinuate fascia which extends from suture to almost the lateral margin and near apex an oblique fascia from the lateral margin to suture. Apex of mesosternum and apical margin of first, second and third abdominal segments, except at middle, densely clothed with yellow pubescence. The fasciae on the elytra are all heavy and of equal width. Length 27 mm.

Beaver Cañon, Utah.

A finely marked insect, which looks very distinct from *nobilis* but presents no good character to give it specific standing.

***Stenosphenus lepidus* Horn**, Trans. Am. Ent. Soc., Vol. XII, p. 179.

Stenosphenus longicollis Casey, Ann. N. Y. Acad., Vol. VI, p. 34.

The description of *longicollis* fits equally well *lepidus*, from which it is said to differ in having "the prosternum in front of the coxæ depressed and coarsely, densely punctate-rugose, except at apical margin, while in *lepidus* this space is divided by a polished, longitudinal elevation, forming thus two depressed areas."

I have examined a number of males of *lepidus* as well as of other species in regard to the constancy of this character and find that the

longitudinal, polished space of the prosternum is a variable character and is present in some specimens, more or less obliterated in others by being sparsely punctate and rugose, while in a few the two areas are united, owing to stronger, coarser punctuation and rugosity of the usually smooth median area.

Dr. Horn described *novatus* as having the prosternum of the male in front of the coxæ coarsely punctured and opaque but none of the males which I have seen has this, though a few have some coarser punctuation and rugosity of this part and are intermediate.

In *debilis* and *dolosus* some males have a more or less smooth median area and others have the prosternum in front coarsely punctured with scarcely an indication of a smooth median area.

In most of the specimens of *beyeri* examined, the prosternum in front of coxæ is coarsely punctate and rugose, though in a very few there is a faint indication of a smoother median space, owing to this part being less coarsely punctate and rugose, while in the specimens of *lugens* the two areas are generally very well defined.

From the foregoing it is very plain that the sculpture of the prosternum in front of coxæ is very variable and cannot be relied upon in the separation of species and even varieties as only a moderate series is necessary to show the variability of the sculpture of the prosternum in most of the species.

Family CISTELIDÆ.

Stenochidus robustus, new species.

Elongate, black. Head densely and coarsely punctate, eyes as in *gracilis* and *cyanescens*; antennæ reaching to the middle of elytra, second joint small, third joint elongate, slightly longer than fourth, the latter slightly wider at apex than third fifth and following gradually decreasing in length, but each wider than any of the preceding joints. Thorax slightly broader than long; sides feebly arcuate and deflexed near apex; apical and basal angles rounded; surface densely and coarsely punctate. Elytra slightly wider than the thorax at base, humeral angles rounded, sides feebly arcuately widening towards apex, striæ relatively very deeply impressed and finely punctate; intervals convex, feebly rugose and finely irregularly punctate. Body beneath sparsely punctate, except the underside of thorax which is more coarsely and densely punctate, prosternum transversely rugose. Tibiæ scarcely curved. Length 10.5 mm.

California. (O. Dietz.)

This species is very distinct from the others by its more robust

form, larger size, deeply impressed elytral striae and convex intervals. The specimen described is a female and has the outer antennal joints relatively wider than those of the females of *gracilis* and *cyanesceus*.

The two species in our list, *gracilis* and *cyanesceus*, seems to be rare, at least in collections, and have been considered by some to be possibly one variable species. I have four females of *gracilis* and a number of *cyanesceus* of both sexes. They are very close and it is possible that specimens of *gracilis* may occur with black legs; however, there is a difference in the relative length of the antennal joints, which are relatively shorter and the outer ones wider in *gracilis*. The form of *gracilis* seems to be also slightly shorter and a little more convex than *cyanesceus*.

I have another form which looks quite distinct on account of color and more elongate, parallel form which seems to be entitled to a name.

***Stenochidus cyanesceus* var. *carbonarius*, new variety.**

Form of *cyanesceus*, but more elongate and parallel; upper surface black, legs and antennæ brown or piceous; thorax less densely punctate than in *cyanesceus*. Length 8.25-9 mm.

Tulare County, California. (O. Dietz.)

There seems to be also a slight difference in the form of antennal and tarsal joints, but the few specimens I have are not quite perfect.

BLATCHLEY'S BEETLES OF INDIANA.¹

This is a volume of 1,386 pages with 590 figures in which 3,555 species of beetles occurring or supposed to occur in Indiana are described, 79 as new species. No such comprehensive work has heretofore appeared on American beetles and the book will be most useful to students of Coleoptera.

The book starts with a brief treatise on the external anatomy of beetles in which the technical terms to be used are explained by text and figures. A copy of the classification of families by Leconte and Horn follows, and then each family is taken up in turn. The treatment includes a brief account of the habits, the division into tribes,

¹ Bulletin No. 1, Indiana Department of Geology and Natural Resources. On the Coleoptera Known to Occur in Indiana, by W. S. Blatchley, Sept. 20, 1910.

genera and species by synoptic tables, supplemented by individual descriptions of each species, with references throughout to the most recent literature and with numerous figures. The volume closes with a glossary and index, the new species being separately indexed on the last page.

The work is largely a compilation from previous publications, but much original work has been required to prepare synopses where none previously existed, and in the comparison of Indiana specimens with the descriptions. It has been a long sustained effort to bring so large a work to a successful conclusion and Mr. Blatchley is to be congratulated on its completion. As a whole, the work seems, after a few weeks use, to be remarkably well done. The number of new species is a little surprising and especially the number described in obscure genera like *Atheta*, *Cis*, *Brachynus* and *Mcianotus*. In addition to the new names given in the index, *Anisodactylus sayi* is proposed on p. 198 for *picus* Lee preoccupied.

The Rhyncophora are not included at all and only species known (2,855) or supposed (700) to occur in Indiana are mentioned. With these limitations the book Mr. Blatchley has prepared will fill a long felt want for all students in the eastern part of the United States who can at last find in one volume nearly all they need for the determination of their beetle captures. For late comers it is to be regretted that the first edition is already exhausted. This, however, indicates the appreciative reception the book has found.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF TUESDAY, MARCH 1, 1910.

Held at the American Museum of Natural History at 8.15 p. m. President C. W. Leng in the chair with twenty-three members and one visitor in attendance.

In the absence of the recording secretary, Mr. C. L. Pollard was elected secretary *pro tem*.

The librarian, Mr. Schaeffer, reported the receipt of the following publications:

Zool. Record, XLV, 1908, Insects.

Coleopterorum Catalogus, Pt. 8.

Zeitschr. f. Wissenschaftl. Insekt. Biol., VI, No. 1.

Berliner Entomol. Zeitschrift, LIV, nos. 3 and 4.

The committee appointed to investigate the purchase of additional book cases reported through its chairman, Mr. Davis, that the Globe-Wernicke Co. would furnish six additional sections, including tops, for \$33, and would make an allowance of about \$2.25 for the return of bottom sections not required by the Society. On motion it was voted that the committee be authorized to make the purchase on these terms.

Dr. Raymond Osburn reported the receipt, for photograph collection, of pictures of Dr. L. Kraatz, Mr. Otto Lugger and Dr. Hugo Soltau and requested further contributions.

Mr. R. P. Dow moved that the regular meeting of April be made a joint meeting with the Brooklyn Entomological Society, and that the members of the latter be duly invited to attend. Motion was carried.

Mr. John D. Sherman addressed the society on the subject "Beetles from Labrador." He referred especially to the three general works on Labrador, viz., "The Labrador Coast," by A. S. Packard; "Along the Labrador Coast," by Charles W. Townsend, and "A Report on the Brown-Harvard Expedition to Labrador in the Year 1900," by E. B. Delabarre, and stated that Packard's list was the only enumeration of Labrador beetles. Mr. Sherman had received nearly 10,000 specimens, representing about 100 species, from various collectors, portions of whose letters were read. A number of specimens were exhibited and commented upon, among them being *Elaphrus obliteratus*, *Trechus rubens*, *Pterostichus punctatissimus*, *Amara glacialis*, *Harpalus fulvilabris*, *Halophus cribrarius*, *Dytiscus parvulus*, *D. doricus*, *Latridius minutus*, *Stenotrachelus arcuatus* and *Mordella borealis*, many of these representing additions to Packard's list. He referred to *Agabus arcticus* as peculiar to Labrador, and mentioned the receipt of an undescribed species of this genus. *Aphodius guttatus* was the only Scarabæid in the collection, but by way of contrast three of the four known North American species of *Paronomus*, a genus of Elateridæ, had been received.

Mr. Thomas Hallinan spoke on "The Morphos and Caligos of the Panamian Isthmus." He described the geography and topography of the region with the aid of a map. It is a country of intense humidity and of very great variation in the extent of rainfall, the two coasts differing in this and other respects. He exhibited several species of *Morpho* and *Caligo*, and commented on their habits, stating that the Morphos fly chiefly in the open, sunny clearings during the morning hours, and are difficult to catch except when flying against the wind; while the Caligos fly in the denser and darker parts of the jungle, where they are protected by the thorny vegetation.

Mr. Charles Schaeffer spoke on "Distinguishing Characters in the Histeridæ." He stated that the number and position of the thoracic striæ afforded the best characters, while the shape of the mesosternum, whether truncate or emarginate, the outline of the front tibiæ, the thoracic hairs and the two pygidia were also important.

Mr. Schaeffer also exhibited and discussed a specimen of *Pterostichus lachrymosus* having a peculiar malformation of the thorax.

Dr. E. B. Southwick exhibited specimens of an orchid, the pseudobulbs of which were infested with a small South American hymenopterous insect, *Iso-soma orchidarum*, a well-known pest of greenhouse orchids both in this country and abroad.

Mr. W. T. Davis exhibited a fly *Spilomyia quadrifasciata* taken by himself on Staten Island some years ago.

C. L. POLLARD,

Secretary pro tem.

MEETING OF TUESDAY, MARCH 15, 1910.

Held at the American Museum of Natural History. President C. W. Leng in the chair with eighteen members and one visitor in attendance.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Wiener Entomol. Zeitung, XXIX, Nos. 2, 3.

Verhandlungen d. K. K. Zool. Bot. Gesellschaft, Wien, LIX, Nos. 7, 8.

Some Bees of the Genus *Augochlora* from the West Indies, T. D. A. Cockerell.

Zeitschrift f. Wissenschaftliche Insekten-biologie, VI, No. 2.

Insects Injurious to Sweet Potatoes in New Jersey, J. B. Smith.

Bull. de la Soc. Entomol. d'Egypt, 1909, No. 3.

Canadian Entomologist, XLII, No. 3.

Coleopterum Catalogus, Part 9 and 10.

Through the president the curator reported that the preliminary arrangement of the Diptera was partially completed and cabinets to contain these and the Hymenoptera had been ordered.

Mr. L. H. Joutel under the title of "A Scarabæid new to Long Island," stated that among a catch of Long Island beetles made by Mr. Engelhardt there were two specimens of *Trichius texanus* Horn. one of which he exhibited with a male of *T. piger*. He pointed out the differences in the males of the two species and called particular attention to the great difference in the front tibia. In *texana* it is very broad, while in *piger* it is quite narrow. He also referred to the differences in the punctures of the thorax of the two species.

Dr. J. L. Zabriskie with the aid of lantern slides spoke on the "Microscopical Examination of some Structures of the beetle *Bruchus discoidens* Say." The antennal structure of the male and female were shown and discussed, special mention being made of the short spine at the apex of the last segment of the male antennæ. Other parts, which were shown and commented upon were the mandibles, two pairs of maxillæ, the peculiar emargination of the eye in which the base of the antenna rests, the legs and details of structure of coxa, trochanter and tarsus, inside view of segments of prothorax to show internal bracing chitinous rods, tergites of abdomen and sculpture of elytra.

Mr. William T. Davis stated that he had recently examined numerous

samples of dried fruits with a view to ascertaining what storage pests were present. A few living larvæ were found on figs, which were reared and proved to be the common moth *Plodia (Ephestia) interpunctella* known to live upon many kinds of stored foods. The most common beetle was *Carpophilus hemipterus* Linn. which was found in dried pears, figs and prunes. The next most common insect was *Silvanus surinamensis* Linn., which occurred in prunes and figs. There also came from the box of prunes one specimen each of *Carpophilus niger* Say, *Cryptophagus debilis* Lec. and a species assigned with much doubt to *Cryptophagus confertus* Casey. In the dried cherries *Cryptophagus acutangulus* Gyll. was collected and in the dried pears *Silvanus advena* Walth. The species of *Cryptophagus* were identified with the assistance of Mr. Charles W. Leng and the synopsis printed in the Society's Journal for June, 1900.

Dr. Osburn reported the capture of the common syrphid fly, *Eristalis tenax*, in the house on Sunday, March 13, which was an unusually early date. Society adjourned.

MEETING OF TUESDAY, APRIL 5, 1910.

Held at the American Museum of Natural History. President C. W. Leng in the chair with twenty-seven members and seven visitors present.

The minutes of the preceding meeting were read and approved.

The librarian read a letter from Prof. Wheeler which explained the delay in the appearance of the March number of the Journal.

Mr. Dow of the Outing Committee announced that field meetings would be arranged for Decoration Day and Fourth of July and that in the meantime frequent short trips would be taken mostly on Saturday afternoons and Sundays. All of those interested were asked to keep in touch with the committee.

The president referred to the death of Dr. Zabriskie in a few appropriate words.

On motion of Mr. Dow, the following resolution, a copy of which the secretary was directed to send to the family of Dr. Zabriskie, was incorporated in the minutes:

Resolved, that the New York Entomological Society has learned with sorrow of the death of Rev. J. L. Zabriskie, a former president of the Society and an active member in attendance at its last meeting, whose knowledge of the microscopic structure of insects added to the scientific interest of its meetings as his oratorical powers, preserved in his seventy-sixth year, added to the dignity of its proceedings, and that this expression of deep regret on the part of its members be spread upon its minutes and published in its proceedings.

Dr. E. B. Southwick added a few words of tribute to the memory of Dr. Zabriskie whom he had known since boyhood, and under whose influence he began the study of natural history.

Professor John B. Smith, by means of numerous stereopticon slides gave an interesting lecture on the subject of collectors and collections.

On motion of Mr. Groth a vote of thanks was tendered to Professor Smith for his interesting lecture.

Society adjourned.

MEETING OF TUESDAY, APRIL 19, 1910.

Held at the American Museum of Natural History at 8:15 p. m. President C. W. Leng in the chair with seventeen members and three visitors present.

Dr. Osburn reported the receipt of a number of photographs to add to the collection of entomologists and stated that the curator had provided a suitable place for storing and exhibiting future additions in this line.

Mr. Dow, of the Field Committee, reported that short collecting trips would be taken on Saturday afternoons and Sundays; and requested that those who desired to take these trips should keep in touch with the committee. The librarian, Mr. Schaeffer, asked for permission to buy four volumes, unbound, of the *Deutsche Entomologische Zeitung* to exchange with Mr. Angell for four bound volumes of the same publication.

Mr. Grossbeck read a paper on the subject of "Observations on the Behavior of the Digger Bee, *Emphor bombiformis* Cresson." Mr. Grossbeck stated that observations were made on a colony of these bees discovered at the edge of a cat-tail swamp near Arlington, N. J., August 26, 1909. The bees were busily engaged in digging burrows in the hard, shaly soil and provisioning them with masses of soft yellow pollen. Over an area three feet in diameter, one main colony of 70 bees had made 127 holes. Three other smaller colonies in the neighborhood were observed. He described their method of burrow-making as well as the burrows, their carrying and storing of pollen of the swamp rose mallow and the egg laying on the pollen balls. Specimens of the bees, plaster casts of their burrows and balls of pollen were exhibited.

Mr. Engelhardt mentioned finding a small burrowing bee at Ft. Lee, N. J., and in Utah, and Mr. Hallinan spoke of noticing similar bees in Panama.

Mr. Schaeffer exhibited a collection of *Mycetophagus* and made some remarks concerning their structural characteristics and their fungus-feeding habits.

Mr. Shoemaker exhibited some varieties of *Papilio philenor* which he had bred last summer, one showing abnormally shorter tails and another with more evidence of white markings on the wings.

Mr. Lutz exhibited and explained a cyanogen gas tank which he had constructed for killing insect pests in the insect collection.

Mr. Engelhardt exhibited some South American and West Indian butterflies and called attention to the close resemblance between *Danaïs erippus* and *D. plexippus* and spoke concerning protective mimicry among the butterflies.

Mr. Davis exhibited Professor Wheeler's new book on "Ants,"

Society adjourned.



THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

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Vice-President, RAYMOND C. OSBURN . . . Columbia University, New York.
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Price List of Entomological Publications

For Sale by the New York Entomological Society.

- LINELL, MARTIN L. A short review of the Chrysomelas of North America. 5 pp. 15c.
- CASEY, THOS. L. Studies in Ptinidæ, Cioidæ, and Sphindidæ of America. 32 pp. 75c.
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The above papers will be sent on receipt of price by

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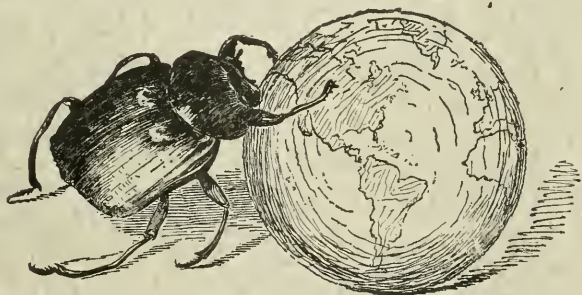
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Publication Committee.

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F. E. LUTZ.

R. C. OSBURN.
W. M. WHEELER.

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SEPTEMBER, 1911.

No. 3.

NEW SPECIES OF NOCTUIDÆ FOR 1911. NO. 1.

BY JOHN B. SMITH, SC.D.,

NEW BRUNSWICK, N. J.

Demas infanta, new species.

Ground color a very dark, dull ashen or smoky gray. The head, collar and breast are paler, more whitish, less powdery, and the antennæ are yellowish. The thorax is a little paler than the primaries and the patagia are crossed by alternate bars of black and whitish as in the others of the genus. Primaries very evenly dark powdered, almost smoky, with the white showing only at the base of the wings. The median lines are just darker than the ground, single, the t.a. preceded the t.p. followed by white scales which are more obvious in the female. Lines are in course like those of *flavicornis*, but there is no connection between them and there is no obvious median shade. S.t. line outwardly dentate on the veins and emphasized by following whitish scales, inwardly diffuse. There is a dusky terminal line preceded by a whitish lunate shade line. The orbicular is small, whitish, round, tending to become punctiform. Reniform small, narrow, elongate, whitish, with a narrow dusky central line. Secondaries uniform smoky brown in both sexes. Beneath, with a whitish hoary powdering over a smoky brown base. Tuftings of anterior legs gray, else the vestiture of thorax and legs whitish.

Expands 38-42 mm. = 1.52-1.68 inches.

Habitat.—New Brighton, Penna., IV, 29 (Merrick); Pennsylvania, V, 2 (Kemp); Johnson City, Tenn., May.

Two males and one female that have come gradually into my collection during the few years recently past. They were at first considered as very dark forms of *flavicornis*; but with both sexes at hand, the difference became obvious. There is more than a casual resemblance to *Scirodonta bilineata* and I should not be much sur-

prised to find examples of this species masquerading among the Notodontids.

***Demas electa*, new species.**

Ground color bluish ash gray, the maculation black or blackish. Head whitish, collar gray. Thorax crossed transversely by alternate bands of black and white. Abdomen smoky. Primaries with the broad sub-terminal area of the palest, least powdered ground, the darkest area extending through the lower half of wing from base to t.p. line. There is a black broken basal line and basal streak. Median lines single, black, narrow, very close together, irregular, an outward tooth from the t.a. line joining an inward curve from the t.p., and thus connecting the two in the submedian interspace. The s.t. space is very wide and is outwardly limited by the slightly irregular and dentate s.t. line which is itself outwardly defined by a whitish shade. A terminal blackish line at base of fringes. Orbicular small, round, whitish, with a black central dot. Reniform oblong, narrow, not well defined, whitish with a distinct central blackish lunate mark. Secondaries blackish, semi-diaphanous, fringes whitish, preceded and cut by blackish. Beneath smoky, powdery, secondaries paler with traces of two diffuse transverse lines and a small discal lunule.

Expands 37-40 mm. = 1.50-1.60 inches.

Habitat.—Winnipeg, Manitoba, May 31, 1909, Mr. J. B. Wallis.

Two very fine females, through Mr. Arthur Gibson of the Central Experimental Farm. As compared with the previously described species this is darker and decidedly blue gray, much better marked than *flavicornis*, with which it agrees in the connected median lines. The latter character and the more contrasting maculation distinguish it from *infanta*, than which it is also a somewhat smaller species. The type is in my collection, the paratype has been returned to Mr. Gibson.

ANTITYPE Hbn.

Under this term Hampson lists the species with lashed eyes that have been heretofore termed *Polia* in European catalogues. No American species are referred to the genus by Hampson, but a series of specimens lately received from California seem best referred to it. The characters other than the lashed eyes are given by Hampson as follows: "Proboscis fully developed; palpi obliquely upturned, short, the 2nd joint thickly clothed with hair in front; frons smooth, rounded, eyes large; antennæ of male typically ciliated; thorax clothed chiefly with scales, or with hair and hair-like scales, the pro- and meta-thorax with spreading crests; pectus clothed with long hair; tibiae fringed with hair; abdomen with dorsal crests on basal

segments. Fore wing with termen crenulate; . . ." The venation offers nothing that is peculiar. The species I have called:

Antitype uintara, new species.

Ground color a dull dark luteous, more or less black powdered, in fresh examples reddish or even with a carmine flush; but that seems to fade out in most examples leaving a smoky or even blackish suffusion that gives the forewings a mottled appearance. Head and thorax with an intermixture of rusty, red and blackish, forming no definite maculation. Primaries with all the lines present, varying from red to brown or black. Basal line geminate, broken; upper half of basal space dark, lower half of the luteous ground, more or less powdered. T.a. line geminate, nearly upright, the outer element distinct, lunate or outcurved in the interspaces, inner element obscure, powdery, broken. T.p. line crenulate and somewhat irregular, as a whole outcurved over cell and only a little incurved below; the inner element usually black, the outer powdery and followed by a row of white or whitish venular dots which are sometimes conspicuous. A diffuse dusky median shade sometimes darkens almost the entire median space. S.t. line very irregular, marked by the contrast between the dusky s.t. space and the terminal space which is of the ground color. There is a series of distinct, rather large terminal lunules, a pale line at the base of the broad tan-brown fringes and a series of dusky lunules at tip of fringes, giving them a crenulate appearance. Claviform wanting. Orbicular small, of the ground color, undefined, varying a little in form but usually almost round. Reniform moderate or rather large, broad kidney-shaped, of the ground color except for a central mark, not distinctly outlined. Secondaries whitish and semi-transparent at base, with a broad almost blackish outer border, the veins blackish: a small blackish discal spot. Beneath, yellowish, powdery, with a distinct discal dot and a continuous extra-discal blackish line on all wings, which also darken outwardly so that the two pairs are unusually similar.

Expands 1.00-1.17 inches = 25-29 mm.

Habitat.—San Diego, Calif., XI, II, III; Witch Creek, California, II, 3-14.

Fourteen examples, all males and in fair to good condition. The species belongs to the typical section of the genus in which the antennæ of male are ciliated, the joints only a little marked. The species is chunky in appearance and resembles at first sight some of the small rather broad winged species of *Mamestra*, like *cuneata*. A fresh specimen with the carmine reddish tint well-marked is really handsome; but the dull, powdery, discolored forms look sordid.

Perigea andrena, new species.

Head, thorax and primaries a soft dark smoky gray, the head and thorax sparsely mingled with whitish scales giving a vague irrorate appearance.

Primaries with the normal maculation traceable only. Basal line indicated by geminate marks on the costa only, the included space a trifle yellowish. T.a. line marked in the same way on costa, but the outer portion of line traceable by black scales in rather even interspaceal outcurves across the wing. T.p. line better marked, traceable across the wing by elevated black scales, which tend to become venular dots; the course an even outcurve over cell, only a little incurved below. S.t. line a little irregular, slightly paler, with a yellowish tinge, variably marked by darker or blackish scales; obvious only when seen at a proper angle to avoid the lustrous effect of the general surface. A series of small black terminal lunules. Claviform barely indicated by black scales. Orbicular small, round, annulate in yellowish and forming the most obvious markings. Reniform large, constricted, incompletely defined, with a partial, narrow, black edging and an incomplete inner ring of yellowish, variable in the specimens. Secondaries white, with a blackish outer border and a narrow, blackish terminal line. Beneath pale, powdery, primaries a little darker, all wings with a more or less obvious extra-median line and discal spot.

Expands 34-35 mm. = 1.35-1.40 inches.

Habitat.—San Diego, California, VII, 31, VIII, 1, XI, 2: George H. Field.

Four examples, all males, in fair condition. The vestiture of this species consists of lustrous scales, easily dislodged and in no case is the thoracic tufting perfect; but it indicates a small anterior and a larger more spreading posterior tuft. In one example there are three small dorsal tuftings on the basal segments of abdomen; but these are wanting on the others. The front is flat, without protuberance, the palpi oblique, reaching to the middle of front. The antennæ have the joints slightly marked and laterally ciliated.

POLIA Auct.

Under the generic term *Polia*, we have always had in our lists an aggregation of species that were not closely related to the European species arranged under the name, and which were not even generically identical. But the species were nearly all rare, were not well known, and they remained unchanged until, in 1895, Mr. Grote proposed the term *Andropolia*, without description, for *theodori* and its immediate allies. Hampson adopts this term for those narrow-winged species with an irregular s.t. line, in which the shadings form two more or less conspicuous triangular patches basing on the outer margin, the apices touching the t.p. line opposite cell and opposite anal angle. The other broad winged forms are referred to *Eurotype* Hampson, and are closely associated with *Xylotype capax* which is a

correct disposition of the matter. Among the species referred to *Andropolia*, we find, first of all *A. diversilincata* Grt., to which *Polia illepida* Grt., ♀, is cited as a synonym. *Andropolia illepida* Grt., ♂, nec ♀, has *Polia resoluta* Sm., as a synonym. With this disposition of the subject I can scarcely agree. Mr. Grote described his *Hadena diversilincata* from a single male collected by Packard, and that type I saw in the Cambridge collection: a badly patched example, covered with mildew, and Mr. Grote seems not to have recognized the species again at any time later. Certainly when, two years thereafter, he described *Polia illepida*, he makes no reference to *Hadena diversilincata*, and he then had both sexes before him. This is not a rare species and Mr. Grote labelled up a number of specimens of both sexes, one of which, a female, is now before me. After seeing types of both species I united them in my Catalogue.

Hampson in his monograph separates the two species as follows:

Forewings with median lines distinct.....	<i>diversilincata</i>
Forewings with median lines almost obsolete	<i>illepida</i>

and this is in line with Mr. Grote's original descriptions. He also brings out a difference in the ground color of primaries, making *diversilincata* gray-white, thickly irrorated with black, while *illepida* is pale gray, suffused and irrorated with red brown. He had before him when he made this separation the male type of *illepida*, and of *diversilincata* there were 1 ♂ and 5 ♀.

I have before me at present, a series of 7 ♂ and 13 ♀ which divide rather nicely into two groups, 3 ♂ and 3 ♀ having a reddish suffusion through the primaries and giving, as a whole, an impression of red, while the others lack all this tingeing and give, as a whole, a decided impression of blue gray, with whiter secondaries. In both series there are specimens in which the median lines are distinct and continuous, and others in which they are practically obsolete, with all sorts of intermediate stages. Furthermore, in the males the lines are generally less distinct and more have them obsolescent, than in the females. None of the ornamental characters in Hampson's descriptions mark permanent differences, and the only thing that does remain is the reddish shading of *illepida* as against the blue gray of *diversilincata*. I have both forms from Colorado but the bulk of my *diversilincata* series is from Arizona and New Mexico. It is also interesting to note that the type locality for *diversilincata* is Manitou

and that I have examples of both forms labelled Colorado Springs, which is practically the same. I have the two series separated in my collection, but doubt whether there are really two species.

Polia resoluta Smith, on the other hand, is altogether different from either of the preceding. The female type is before me and has a pure white ground and white secondaries, besides differing in other details. It is paler than the male type, but I have another female that matches the male more nearly in that respect. It differs from both *illepida* and *diversilineata* far more than these differ from each other, and I feel sure that Sir George could not have seen my species at all.

I have another series of five clean and definitely marked examples from Utah, which stand out at once and are surely undescribed.

***Andropolia submissa*, new species.**

Ground color of head, thorax and abdomen white, more or less closely black powdered, so that it may at first impress one as light blue gray. Head with a black frontal line. Collar with a variably marked dusky shading, which may be entirely absent below tip. Patagia sometimes with a fairly marked submarginal dark border, more often without obvious maculation. Primaries neatly marked, very like *illepida* on the whole, but varying in the relative distinctness of the individual features. In all cases the single black or blackish median lines are present: t.a. with a slight and rather even out-curve to vein 1, below which it curves out rather abruptly; the t.p. bent abruptly outward below costa and then very evenly, almost parallel with the outer margin to the inner border. The s.t. line is very irregular, forms two long black teeth on veins 3 and 4, reaching the outer margin at that point, and above and below this so shaded as to form two triangular black patches which vary much in distinctness. Quite usually a black streak from the lower dark patch extends inward across the t.p. line and well into the median space below vein 2. A median shade starts obliquely outward from a well-defined black or blackish costal patch to the lower angle of the reniform; then becomes less distinct and runs parallel with and close to the t.p. line. The basal line is fragmentary, but marked in all cases, tending to become geminate, and in the best marked individual there is a slender black line from base to t.a. line, at the point where the small, loop-like claviform is attached. This line and even the claviform may be altogether wanting. Orbicular concolorous, irregularly ovate, oblique, moderate in size, incompletely outlined. Reniform large, kidney-shaped, tinged with rusty brown, more or less invaded inferiorly by the median shade, outlined by darker scales and a somewhat broader pale annulus within them. A series of black terminal lunules. Secondaries whitish to a rather faint extra-median line, beyond which they are blackish gray, darkening to the white fringes. Beneath, whitish with scanty black

powderings, most obvious on the primaries. In the best marked examples a dusky discal spot and an extra-median spot are traceable; but usually there is no obvious maculation.

Expands 1.60-1.75 inches = 40-44 mm.

Habitat.—Provo, Utah, VIII, 8, Mr. Tom. Spalding.

Five females in good condition, varying greatly in markings, but yet looking very much alike. On the whole much paler than in *diversilineata* and without the reddish shading of *illepida*.

So closely does this species resemble the others referred to this series, that it is fair to assume that the male will be found to have pectinated antennæ.

***Polia theodori* Grt. and *Polia epichysis* Grt.**

These are two remarkably similar forms, described as distinct by Mr. Grote, but usually accepted as color variations and so referred by me. Hampson follows the reference, with both types and an apparent total of five examples of both forms under examination. With a materially larger series of each, I am not so sure as I once was, of their identity, the pure white secondaries of both sexes in *theodori*, standing out prominently against the smoky reddish suffusion in *epichysis*.

A much smaller species evidently belonging here but unlike any other thus far described, is

***Andropolia olga*, new species.**

Head, thorax and primaries white, powdered with black atoms and locally suffused with rusty brown. Head with a broad inferior black band and a narrow interantennal black line: sides of palpi rusty brown. Collar dark brown above a narrow black line. Disc rusty brown, posterior tuft marked with umber brown. Patagia with a rusty shading, edged by a narrow black line. Primaries with rusty shading at base, through the outer half of median space and over the s.t. line, not defined nor exactly localized. Transverse lines black, distinct, single. Basal line broken, dentate. T.a. line outwardly oblique, strongly dentate, the tooth below vein 1 connecting with the median shade and greatly narrowing the median space. T.p. line narrow, only a little denticulate, moderately outcurved over cell and nearly parallel with outer margin below it. Median shade broad, conspicuous, diffuse, outwardly oblique from costa to lower outer angle of reniform, then close to and parallel with t.p. line to inner margin. S.t. line conspicuous, black, irregular, diffuse, with strong outward teeth not reaching the margin on veins 3 and 4, a long inward tooth to the t.p. line opposite cell, and a similar tooth in sub-median interspace, where a brown shading obscures a black streak which is traceable from the outer margin to the narrow loop-like claviform. A diffuse brownish black

shade extends through the lower half of submedian interspace from base to median shade. Orbicular oval, decumbent, broadly black-ringed, centered with rusty. Reniform moderate in size, kidney-shaped, black-ringed, rusty-centered, Secondaries white, with a slightly iridescent smoky shading which is most obvious at hind angle. Beneath white, a little powdered, with a punctiform extra-median line and a discal spot on each wing.

Expands 1.55 inches = 39 mm.

Habitat.—Sierra Nevada, California.

One male in good condition, which has been in my collection for twenty years or more. It is a conspicuous form and I have been constantly hoping to get others—thus far without success.

The antennæ of the male are ciliate and the species is therefore related to *thcodori*, to which also the type of maculation refers it.

XYLOMIGES Gn.

In re-arranging my specimens belonging to this genus (*Xylomania* Hampson), I separated out the sexes of the long suites of the *rubrica* series and noted, what I had not realized before, that all the uniformly colored specimens were males, and that all those in which there was a curved black shading that separated off a more or less contrasting apical area were females. It turned out that I had 21♂ and 20 ♀, and that these separated very nicely into three distinct types. Of *X. pulchella* Sm., I have 2 ♂ and 1 ♀, and they differ from all others in the very dark basal and s.t. areas, leaving the median space contrastingly pale with only a slight reddish tint. The curved shade in the female is broad, black and contrasting. They are from Vancouver, Laggan and N. W. British Columbia without dates.

Of *X. rubrica* Harv., I have 8 males and 7 females coming from California, Oregon, Washington, Colorado and British Columbia: all early dates—March and April. Hampson had only 2 females of *rubrica*, one of them the type, and the figure 14 on his plate LXXXIX, is a very good representation of that sex. Of *X. perlubens* Grt., he had only the male type and that is figure 19 of the same plate, and not so good a figure. There is no doubt however that it is the male to Harvey's species, and is not my *subapicalis*, which has the sexes similar and has a narrower curved shading on a much darker base. *Rubrica* has the median lines distinct in both sexes, the coloring and maculation is lively, and is a mottling of creamy, reddish and gray tints, with the black or blackish brown curved subapical mark in the female strongly contrasting.

There remains a series of 11 males and 11 females, all from Pullman, Washington, in May, and all very much more uniform in tint. The males are almost uniform reddish gray, the median lines lost, the s.t. rather contrastingly yellow and very narrow. The ordinary spots are fairly well defined; but are scarcely relieved in tint. The female is brighter and the apical area is paler and with a reddish shading; but the curved shading is only blackish, outwardly diffuse and not contrasting. This form I have labelled *mustelina*, and it forms the beginning of the development of the series which culminates in *pulchella*.

Subapicalis is not so closely allied to this series as I had believed from insufficient material, and the original reference of my species to the synonymy was made by myself after an inspection of Grote's type of *perlubens*. Hampson apparently did not have my species at all, and simply followed my reference.

***Tricholita ulamora*, new species.**

Head and thorax hoary reddish gray, almost fawn gray, immaculate. Primaries dull reddish brown, powdery, the white-marked reniform being the only conspicuous feature. The median lines are very narrow, black, thread-like, the t.a. with large outward teeth in the interspaces, the t.p. narrowly crenulate. A narrow black terminal line, cut by yellowish venular dots at base of fringes. Claviform small, vaguely indicated by black scales. Orbicular small, round, concolorous, very narrowly black-ringed. Reniform small, narrow, upright, outwardly and inferiorly marked with white dots that relieve it from the surroundings. Secondaries whitish, black powdered, with a small black discal dot. Beneath smoky, powdery, primaries much darker, each wing with a discal spot.

Expands 1.34 inches = 33 mm.

Habitat.—San Diego, California, X, 20, 1908, Mr. George H. Field.

A single male in good condition, the antennæ lengthily pectinated. The species somewhat resembles *artega* Barnes, which has however more pointed primaries, and has the secondaries of the male smoky fuscous, without discal spot.

It was received from Mr. Field under the number 73, and has had no mates since its receipt, from any source.

***Tricholita endiva*, new species.**

Head, thorax and primaries a rather soft mouse gray, the head and thorax without markings. Primaries with all the transverse maculation lost except for the narrow terminal blackish line which is very narrowly cut with

white on the veins. The loop-like concolorous claviform is narrowly outlined in black in most specimens, but tends to become obsolescent. Orbicular obsolete. Reniform small, narrow, a little constricted, with the inner margin obscurely defined by black scales, the outer edge marked by a series of small white dots: a white spur runs back from lower angle of reniform along the median vein: usually a very short distance only—exceptionally nearly half way to the base: and usually this streak is edged by black scales. Secondaries, in the male soiled white, with a small dark discal dot and a narrow blackish exterior border: in the female blackish throughout, paler and somewhat more transparent at base. Beneath whitish, powdery, in the male, blackish powdery in the female.

Expands 1.06–1.16 inches = 26–29 mm.

Habitat.—Yavapai County, Arizona, in September (Mr. Otto Buchholz); Santa Catalina Mts., Arizona, in September (Dr. Barnes); Ft. Wingate, New Mexico, August 28.

Four males and four females in good or fair condition—five of them from Mr. Buchholz who has others. This is a little smaller and much darker than *chipeta* Barnes, which it resembles most nearly in maculation. In the latter the markings are also much better written, the orbicular is distinct in all the specimens before me and the claviform is usually connected with the base by a narrow black streak. I had confused the two examples that I had prior to receiving Mr. Buchholz's specimens, with *fistula* Harv., which is a larger form and has some of the transverse maculation present in almost all examples, the s.t. space tending to become relieved against the darker terminal area. The male antennæ are lengthily, the female very shortly pectinated, resembling in this both *chipeta* and *fistula*.

***Tricholita erebus*, new species.**

Head, thorax and primaries dull black with a purplish tinge. Head and thorax without markings. Primaries with the normal markings traceable by velvety black scales and by a few yellow scales. At base there is a velvety black mark indicating the basal line on cell. A geminate t.a. line is just traceable in some specimens and to it is attached the loop-like claviform which is distinctly outlined in velvety black in all specimens. The orbicular is small, round, narrowly black ringed and this black ring is sometimes edged inwardly with yellow scales. Reniform small, upright, incompletely outlined, the outer border edged with whitish scales. T.p. line vaguely traceable in some specimens. S.t. line indicated by scattering whitish or yellow scales, preceded by more or less obvious sagittate velvety black marks. A very narrow yellowish line at base of fringes, and small yellow dots at ends of veins. Secondaries whitish at base, darkening to blackish outwardly: a narrow blackish extra-median line and a discal mark. Beneath: primaries blackish,

powdery; secondaries whitish, black powdered; all wings with an extra-median line and a discal spot.

Expands 1.32-1.40 inches = 33-35 mm.

Habitat.—Chiricahua Mts., Arizona.

One male and three female examples in fair condition only. The specimens had evidently been papered and are somewhat flattened; but the wings and their vestiture are practically intact. No date is on the label and no indication of the source from which they were received.

The antennæ of the females are only a little less lengthily pectinated than those of the male, and in this character the relation is close to the typical species. The superficial resemblance is to *Hadena impulsæ*.

***Perigonica eldana*, new species.**

Ground color pale luteous with a slightly reddish tinge, variable in the specimens. Head inferiorly blackish, else head and thorax concolorous, immaculate; abdomen paler. Primaries more or less obviously irrorate with blackish, all the markings traceable, rarely complete and tending to obsolescence. Basal line geminate, punctiform, traceable in the best marked examples to the inner margin. T.a. line only a little irregular, moderately outcurved and outwardly oblique, the outer portion even, but tending to break; not lunulate, inner portion powdery, punctiform or altogether lost so that the line appears single. T.p. line dusky, lunulate when best marked, outer portion venular and punctiform. Median shade line obvious in all specimens, darkest and most obvious from the middle of costa obliquely outward to the lower edge of reniform, there angled and thereafter close to and parallel with t.p. line to the inner margin, becoming less obvious in the paler examples. S.t. line of the palest ground, chiefly relieved by the dusky powdering of the rest of the wing, but preceded on costa by a dusky shading. A series of black terminal dots. Orbicular round or a little ovate, moderate in size, outlined by blackish scales or almost lost in the uniform powdering. Reniform upright, a little constricted medially, vaguely outlined by a pale annulus which may or may not be emphasized by blackish defining scales. Secondaries whitish, with a smoky outer border that is less marked in the male and with a small blackish discal dot. Beneath pale with a faint reddish tinge, coarsely powdered along the costal area, all wings with a discal spot, primaries with an extramedian line which becomes lost before it reaches the inner margin.

Expands 38-43 mm. = 1.52-1.72 inches.

Habitat.—Glenwood Springs, Colorado, in May (Barnes); So. Arizona, April and May (Poling).

Three males and three females, mostly in good condition. This species resembles *angulata* Sm., in size and general appearance; but

has the antennæ of the male pectinated instead of serrated and bristled. It is the species described and figured by Hampson as *tertia* Dyar: but is not the species described by Dyar under that name. Dyar's first note on the species is in his catalogue (1902) in which he says, following the name, "markings of *angulata*, antennæ of *fulminans*." California and Oregon are given as localities. The descriptive words would fit the species just characterized here, most excellently well, and probably Hampson depended upon them in his identification of the species. But in the Proc. Ent. Soc. Wash., V, 294 (1903), Dyar gives a further description of the species, basing it on three examples, two of them from Portland, Oregon, under date of April 23 and May 11. Two characteristic features are the definite statement that the ordinary spots are blackish filled, and the absence of all reference to a median line. The expanse is given as 37 mm.

I have two examples from Corvallis, Oregon, both taken in April—one of them April 22, and complying in every respect with Dyar's description. They are labelled *tertia* Dyar, apparently after comparison made, but there is no statement to that effect on the label.

Hampson in Vol. V of his Catalogue, p. 435, describes *tertia* Dyar, from one Californian and two Arizona examples, no definite locality being given in either instance. Portland, Oregon, is also cited, evidently from Dyar, but the description accords in no way with that given by the latter author. The angulated median shade is specifically mentioned and the ordinary spots are said to be ill defined and the reniform merely darkened inferiorly. The expanse is given as 44 mm., as against 37 mm. The figure 30, on plate XC, is from an Arizona specimen and represents perfectly the little series of six examples now before me. Dr. Dyar's species as based on the Oregon examples and his description, is a perfectly good one and entirely distinct from the species characterized under the same name by Hampson, which I have just described as *eldana*. *P. punctilinea* Sm., from the same general region, has the primaries much less angulated and has dusky secondaries, resembling the species of *Stretchia* more closely.

***Perigonica fermata*, new species.**

Ground color pale luteous, with a more or less obvious reddish tinge and, in some specimens, a scant powdering of fine black atoms. Head inferiorly

and palpi, blackish at sides: else head and thorax uniformly of ground. Primaries without contrasts, the usual maculation very finely written. Basal line geminate, tending to become lost, usually marked by a pair of oblique dusky streaks below median vein. T.a. line geminate, tending to obsolescence, and entirely lost in some specimens; in the best case broken, nearly upright, a little outcurved between the veins. T.p. line usually reduced to a narrow pale line and a series of small black venular dots, as a whole broadly bisinuate: in some examples the pale line tends to obtain a definite margin at some parts of its course. S.t. line narrow, pale, continuous, almost parallel with outer margin. Small black terminal dots in some specimens only. An oblique dusky median shade is marked over the costal region in all specimens and is lost in the reniform or only vaguely traceable below it, close to the t.p. line. Orbicular concolorous or a little darker, narrowly pale ringed, moderate in size, oblique, oval. Reniform a little darker than ground, narrowly pale ringed, narrow, very much elongated. Secondaries whitish, semi-transparent, veins a little soiled. Beneath whitish, powdery along the costal and apical region, primaries with a dark discal spot and extramedial line; secondaries with costal spot only.

Expands 1.36-1.48 inches = 34-37 mm.

Habitat.—San Diego, California, in early March.

Six males and one female in fair condition only, received through Mr. H. H. Brehme. The female is a little darker than any of the males and the ordinary spots are a little more relieved; but otherwise there is no difference. The angulation of the primaries is well marked and the indications are that in perfect specimens the fringes are crenulated.

STRETCHIA Hy. Edw.

In re-arranging the species referred to this genus in our lists, divided by Hampson among *Perigrapha*, *Stretchia*, *Xylomania* and *Monima*, I was struck with the remarkable constancy of the species when properly separated out and with the ease with which a little carelessness or lack of sufficient material, may give an erroneous impression.

For convenience I list all the species mentioned here as *Stretchia*, and give the order in the apparent relation of our own species.

S. prima Sm. Only a single male example from Sierra Nevada; very unlike any other of the species.

S. normalis Grt. Fifteen examples, nearly equally divided as to sex and practically alike, though they range in locality from British Columbia to middle California, and six widely separated points are represented. The only difference is in the amount of contrast and

that may be due in most instances to the age or condition of the examples.

S. inferior Smith is not represented in the series now before me.

S. plusiiformis Hy. Edw. Ten males and three females from various points in Colorado and Washington. Practically no differences in the markings; but quite some difference in the amount of contrasts. An unusually bright example might readily be referred to *muricina*, and indeed my series was mixed. In *plusiiformis* the terminal and s.t. areas are of the same gray color, and the s.t. line is practically parallel with the outer margin. In *muricina* the terminal area is paler than the rest of the wing, and the inner margin of this pale area forms a very decided inward curve or arcuation.

S. muricina Grote. Four males and two females, much brighter and more contrasting than *plusiiformis*, from which it has been differentiated above.

S. behrensiana Grote. Not represented in my collection.

S. accurata Hy. Edw. Described as a *Plusia* and looks it. I have only one female from Las Vegas, New Mexico.

S. erythrolita Grote. I was rather proud of my series of this species, containing 13 ♂ and 16 ♀ and meant, after separating out the sexes, to make a series running from almost uniform powdery gray to nearly black; but after I had made my separation of the sexes there was a hitch in forming the series, until I recognized that I had three species. The type form of *erythrolita* Grote was fixed by a specimen bearing the author's label, coming from the type material and agreeing also with Hampson's figure and description. Of this I have six males and four females. The males are very uniform in color and appearance, the females differ a little more. In all cases the primaries are pale violet gray, a little powdery, and the median lines are lost. The ordinary spots are more or less darkened, narrowly ringed with yellow and always present. The s.t. line is characteristic, bi-sinuate, never continuous, not reaching the costa in any case, preceded by a blackish shading which is always interrupted in the middle and tends to become reduced. In the male the only variation noted is the tendency to lose all the blackish shadings. Among the females, one example is an almost uniform smoky gray. My examples are from Witch Creek and San Diego, California, and are dated in February.

***Stretchia apicata*, new species.**

Resembles *erythrolita* in general type of maculation and appearance: but is a little more robust and of a powdery fawn brown. The median lines are traceable by venular dots, the reniform is a rather large, ill-defined dark blotch, and the s.t. line is almost or quite continuous to near costa, where it is met by a little spur from the apex, so that the line to all appearance runs continuously to the apex itself and not to the costa. The blotchy reniform, the ground color, and the course of the s.t. line, characterize the species.

The male is labelled San Diego in February, the female Pasadena, IV, 30. There are only two examples, and there may be more variation than I suspect, when more material comes to hand.

***Stretchia acutangula*, new species.**

Has the pale blue gray ground of *erythrolita*, and looks like a form of that species in which the transverse maculation is present. In normal examples the geminate median lines are well marked, and a well defined median shade is also present. The s.t. space is always dark, in contrast to the pale terminal area, and the s.t. line is thus continuously and sharply defined for its full length; a very distinct and sharp tooth being formed just below the apex, which is the characteristic feature of this species. The tendency is for the blackish s.t. shade to extend inwardly and, in the male, it reaches the median shade in one example. In the female it may reach the t.a. line, leaving only the basal area gray and, indeed, in that sex the entire specimen may become so uniformly smoky that even the characteristic s.t. line is to be made out only with difficulty.

There are 6 ♂ and 11 ♀ from Witch Creek, San Diego, Monterey and Pasadena, California, in November, February and March.

***S. pulchella* Harvey.**

Of this species I have only 2 ♂ and 2 ♀, from Colorado (Bruce) and California; one example labelled Santa Clara Co., the other with a State label only. No two specimens are alike, and at first blush an extremely variable species is indicated. But here again, careful study shows that the markings in all are absolutely identical and only the relative distinctness of the ornamentation varies. The characteristic feature of the species seems to be the very strongly crenulated t.p. line, and the well defined dusky orbicular. I re-described the species as *addenda*, from a type showing no marked contrasts, and came near re-describing it again as *orbiculata* from a type in which the orbicular is unusually contrasting. Hampson with both species before him did not recognize their relationship, and refers *pulchella* to *Perigrapha*, while *addenda* figures as *Monima*.

S. fringata Smith.

Described under *Tæniocampa*, but belonging better with this series. There are 17 ♂ and 1 ♀ under examination, all from Monterey Co., California, in March, and all practically alike. The color is a very uniform pale reddish brown, with a tendency to a violet gray suffusion, and all the normal maculation is present, just enough darker than the ground to be easily traceable. The wing-form and general appearance is not unlike the more uniform examples of *pulchella*, but the antennæ are very shortly pectinated and not much more marked than in *præses*.

Stretchia algula, new species.

Deep purplish red brown, with a tendency to violet gray. Head and collar tending toward a more crimson tinge; but this varies and on the collar is not always uniform. On the primaries the maculation is just traceable in some of the specimens, altogether lost in others, and distinct in none of those before me. The median space may be a little darker and the moderate, well separated ordinary spots, may have slightly paler annuli that bring them somewhat into relief. The median lines are geminate, the outer portion of t.p. line venular and punctiform. Secondaries dull smoky brown in both sexes. Beneath with a crimson tinge, powdery, disc of primaries darker, secondaries paler, with a discal mark and a more or less obvious extra-median dotted line.

Expands 1.36-1.52 inches = 34-38 mm.

Habitat.—Arrowhead Lake, British Columbia.

Two ♂ and 4 ♀, all from the Barnes collection. The species is a very robust one, with lengthily pectinated male antennæ, and there seems to be nothing in our fauna with which it might be readily confused. Except for the slight differences in distinctness of maculation there is absolutely no variation.

S. achsha Dyar. Two males and one female from Arrowhead Lake, out of the Barnes Collection, agree almost perfectly with the description and I have little doubt as to the identity of the species. The specimens are very much alike, and easily recognizable by the peculiar contrasts in shading on primaries. The ordinary spots are well separated, narrowly ringed with pale and the median lines are geminate. The primaries are violet gray except in the lower portion of basal and most of the median space, which are purplish red brown.

S. transparens Grt. Not in my collection and seems to be rare. *Orthosia hamifera* Grt. is cited as a synonym and the only specimens known to me are in the U. S. N. M.

S. præses Grt. I have 4 ♂ and 3 ♀ of what may be considered the more typical form, and two males of whose standing I am uncertain. In this form the male antennæ are serrate and bristled rather than actually pectinated, and the head and collar are paler than the body of the thorax. On the primaries the ordinary spots tend to become confluent, and the s.t. line is well defined or even contrasting. There is a tendency to a black filling between the ordinary spots; but how far this goes, my series leaves me in doubt.

Extends from Monterey, California, north to British Columbia.

S. saleppa Smith. Agrees with *præses* in the paler head and collar, but is otherwise amply distinct. It is a strigate, mottled form, tending to become blotchy, and altogether different from the smooth even markings of *præses*. My series at present contains 5 ♂ and 2 ♀. All my examples are from Wellington, British Columbia, and were taken in April.

***Pleonectyptera serena*, new species.**

Ground color ranges from pale or bluish ashen to reddish or yellowish gray, the gray sometimes tending to drop out of the reddish or yellowish combination. Primaries more or less powdery. Median lines incepted at costa by more or less obvious black or blackish triangular spots. T.a. line nearly upright, almost rigid, consisting of a rusty reddish or yellowish inner and a smoky or blackish or black outer line. This is a variable feature, the line being scarcely traceable in some examples, while in a very few, the blackish or black portion only is obvious, usually more or less broken. T.p. line very evenly and only a little bi-sinuate, sometimes broken or bent on the internal vein. It consists of a rusty reddish or yellowish central line, inwardly bordered by a narrow blackish or smoky line and outwardly by the darker s.t. space more or less emphasized by smoky or black margining scales. This line also varies, but is always conspicuously present and the pale included shade is always one of the obvious features. The preceding shade line is a continuation from the costal spot and is most often narrow, smoky and continuous: it is rarely altogether absent, but may be broken and sometimes is marked with black scales, especially between veins 1 and 4: in one example it is almost continuously black. The s.t. line is rather irregularly and strongly sinuate, making a rather small outcurve over veins 7-9 and another, much better marked over veins 3 and 4, where small outward dents often break into the terminal space. This line is usually marked by the difference between the dark subterminal and paler terminal space: sometimes it is an almost continuous white line, sometimes it is broken into white dots and sometimes it is preceded by a distinct darker shade which may be emphasized by black marks. There is a more or less obvious series of blackish terminal lunules. The s.t. space is usually the darkest part of the wing; but the shad-

ing may be continuous and contrasting, or it may be more or less broken and inconspicuous. Reniform moderate in size, black powdered, rarely contrasting, more or less obviously kidney-shaped. Secondaries whitish, tinged with smoky, yellowish or reddish as the ground may be, outwardly darker and tending to form an extra-median or sub-marginal transverse line: discal spot usually indicated, never obvious. Beneath reddish to yellowish with the maculation of upper surface more or less obviously indicated, discal dots usually obvious.

Expands, .84-1.00 inches = 21-25 mm.

Habitat.—San Diego, California, V, 2, VI, 9, VII, 31, VIII, 1, IX, 29; Plumas Co., Calif., V, 1; Pasadena, Calif., VI, 20: "California," III, 21.

Ten males, 14 females, most of them good specimens, and all the San Diego examples from Mr. George H. Field. The species is a variable one as appears from the description, and two broods appear to be represented. The early specimens are usually larger, and better, more contrastingly marked: the latter examples are smaller and more even—having indeed a somewhat washed-out appearance. I was at first inclined to suspect two species, appearing at different dates; but some of each series agree perfectly with examples of the other.

This species has the appearance and habitus of *finitima*, with the maculation of *secundalis*, especially in the course of the s.t. line; but I believe it to be perfectly distinct from each.

In the Pomona College Journal of Entomology, Vol. II, p. 375, Dr. Harrison G. Dyar describes *Plconectyptera cumalalis* and writes in comment: "This appears to be the species misidentified by Smith as *P. finitima* Smith (Trans. Am. Ent., XXXIII, 377, 1907) which therefore requires a new name. The types of *finitima* are identical with *tonalis* Smith of the paper cited, the name *finitima* having precedence."

Dr. Dyar's description certainly fits the *finitima* of my paper and my description in that paper fits the specimens under that name in my collection. I am therefore agreed that *cumalalis* Dyar, is the same as *finitima* Smith, Trans. Am. Ent. Soc., 1907 and also of the original description.

The original description was based on four examples received among others from Dr. Riley, for a paper to be published in Insect Life. Each of these specimens was labelled "type" in accordance with the general practice of the time. Two of them were retained by

myself and are now before me: two others were returned to the Museum. All of the examples were from the Kœbele material and, I believe, specifically identical. My own examples, therefore, are as much "type" as those at Washington, they formed the basis of both the original description and that of the revision, and the charge that I "misidentified" the species, is therefore absurd.

Pleconctyptera tenalis (not *tonalis*) was originally described from six examples, all from Arizona desert areas, and three of these, including the male and female types are now before me. Now the types of *tenalis* and *finitima* are so utterly unlike that not the merest tyro would be inclined to associate them, and if the specimens in the U. S. National Museum labelled as *finitima* type are really *tenalis* as Dr. Dyar says, it simply means that there has been a tampering with labels by somebody—a fact that I have been inclined to suspect before as to other species. It is not a matter of two closely allied species, as *finitima* and *serena* may perhaps be said to be; but of forms so utterly different in size, in color, in maculation and even in wing form, that mere error of association is excluded.

NEW SPECIES AND GENERA OF NORTH AMERICAN LEPIDOPTERA.

By WM. BARNES, M.D., AND J. McDUNNOUGH, Ph.D.,

DECATUR, ILL.

Family LITHOSIANÆ.

Agylla septentrionalis, new species.

Palpi, front, antennæ and tegulæ bright orange; patagia and thorax white; abdomen dorsally gray, ventrally orange; legs orange, tarsi and half of tibiæ of first two pairs gray; primaries silvery white, costal edge blackish at base; secondaries slightly tinged with fuscous. Beneath, primaries smoky; costal edge tinged with orange in central portion; secondaries white, slightly fuscous along costa.

Expanse 38 mm.

Habitat.—Chiricahua Mts., Ariz. 1 ♀. Type Coll. Barnes.

This is the first *Agylla* species recorded from the United States. According to Hampson (Cat. Lep. Het., II) it appears to be closest

to *nivea* Wlk. but differs in having the whole head and tegulae orange. We cannot however place it exactly as we have not yet seen a specimen of the male sex.

Family NOCTUIDÆ.

Grotella olivacea, new species.

Light olive brown; primaries crossed by t.a. and t.p. lines of darker brown, often indistinct; former straight below costa, with strong outward curve below the cell; t.p. line slightly outcurved and dentate beyond cell, thence with single incurve to inner margin; small white dot at end of cell and traces of a dark subterminal shade; secondaries lighter than primaries, immaculate. Beneath as above without markings.

Expanse 19 mm.

Habitat.—Deming, N. M. (Sept. 1-7), Tucson, Ariz. (July 24-31). 2 ♂, 5 ♀. Types Coll. Barnes.

Agrees exactly in structure with the genus *Grotella*, but is very dissimilar in general appearance, resembling somewhat a small *Narthecophora pulvcrea*.

Lygranthœcia carolinensis, new species.

Front and tegulae dark olivaceous; thorax and abdomen light ochreous; primaries very glossy, light ochreous; secondaries largely smoky brown, ochreous towards base with large discal spot, fringes light. Beneath deep smoky-brown with light fringes; secondaries more or less ochreous with prominent discal spot.

Expanse 24 mm.

Habitat.—Southern Pines, N. C. (Aug. 1-7). 1 ♂, 2 ♀♀. Types Coll. Barnes.

Related closely to *bimatrix* Harvey, with which it agrees in structure, fore tibiae possessing 2 claws and a spine on inner side and 3 claws on outer. It is however a smaller insect and the primaries are not silvery white but glossy ochreous.

Chlorocleptia imperialis, new species.

Male.—Thorax and primaries light olive-brown, terminal area slightly darker than remainder of wing; maculation obsolete, t.p. line and reniform can, on careful observation, be just distinguished as slightly darker shades; secondaries smoky-brown with light fringes.

Female.—Primaries largely suffused with pale pinkish, terminal area olive, slightly lighter than in male; secondaries as in male.

Beneath in both sexes ochreous with central area of primaries suffused with smoky-brown and with large discal dot. In female some pink shading along costa of both wings.

Expanse 26 mm.

Habitat.—Imperial Valley, Calif. (March 3). 1 ♂, 1 ♀. Types Coll. Barnes.

The species is closely related to *simplex* Sm. from Colorado, is however slighter in build and the color of primaries is considerably deeper, lacking the greenish tinge of *simplex*. We have seen no female specimens of this latter species with pink suffusion.

PROCHLORIDEA, new genus. (Type *P. modesta* sp. nov.)

Proboscis fully developed; palpi upturned to slightly beyond front; front with rounded protuberance, without infra-clypeal plate; eyes naked, rounded; mid-tibiæ spined; hind tibiæ unspined; fore tibiæ with a slender apical spur on outer side and 3 or 4 spines considerably above it, a similar spur on inner side with a minute spine just behind; head and thorax clothed with hair and scales; venation as in *Schinia*.

This genus seems best associated with *Chloridea* and *Oxylos*, according to Hampson (Cat. Lep. Phal., Vol. IV); we have been unable to find in the tables of genera any with unspined hind-tibiæ, a feature which is certainly shown by the specimens before us. In this respect *Prochloridea* approaches *Grotella*, which is supposed to bear a single spine on hind tibiæ between the spurs; we have however noted specimens with entirely unarmed hind-tibiæ. In general appearance *modesta* resembles a *Homohadena*, but the spined mid-tibiæ and peculiar structure of the fore-tibiæ preclude this association.

***Prochloridea modesta*, new species.**

Female.—Front ochreous; head and thorax clothed with brown scales and hairs, intermingled with white; abdomen gray, smoothly scaled; primaries brown, irrorate slightly with darker in and beyond the cell and on inner margin; all maculation very indistinct; a slight basal streak extending below cubitus half way to origin of vein Cu_2 ; t.a. line absent or represented by a few indistinct dentate marks above inner margin; orbicular absent; reniform represented by a slight white mark; t.p. line very obscure, dentate, only traceable by some whitish shading immediately following it; terminal space somewhat lighter with several obscure dark dashes, most prominent opposite reniform; fringes light brown checkered with darker. Secondaries white, with slight smoky traces along outer margin; veins more or less defined in brown. Beneath white, irrorate with brown scales along costa and outer margin.

Expanse 32 mm.

Habitat.—Ft. Wingate, N. M. 4 ♀♀. Types Coll. Barnes.

A very obscurely marked species in which the most noticeable feature is the white dot in the position of the reniform.

Protagrotis obscura, new species.

Head, thorax, abdomen and wings concolorous, varying from pale ochreous to light reddish-brown; markings sometimes entirely wanting, always very indistinct; in darker specimens traces of a reddish basal dash and scaling at base of inner margin, usually however lacking entirely; t.a. line not traceable; orbicular when present oval, oblique, whitish; reniform obscure, whitish, with slight darkish central scaling; t.p. line an indistinct light line on darker background, well outcurved around reniform, thence incurved to inner margin; submarginal line occasionally present as an irregular whitish line preceding a somewhat darker terminal area; in most cases terminal and subterminal areas are unicolorous and the line is lacking; terminal row of dark lunular marks at base of ochreous fringes usually present, occasionally wanting; secondaries light buff, more or less obscured with smoky. Beneath light ochre, with or without darker postmedial line on both wings; secondaries often with discal dot.

Expanse 35 mm.

Habitat.—Reno, Nevada. 10 ♂♂, 4 ♀♀. Type Coll. Barnes.

This species has two small spines on hind tibiae between the two pairs of spurs, which in connection with the hairy thorax would place it in Hampson's genus *Protagrotis*. It seems to bear a considerable resemblance to *viralis* Grt. from Nebraska, but the markings are not nearly so prominent as in the figure of this species given by Hampson (Cat. Lep. Phal., IV, 656). In general appearance it most closely approaches *Agroperina indela* Sm.; no two of the specimens before us are exactly similar, but all seem to belong to one variable species; we have taken as type a specimen about midway between the two extremes of color and markings. The general light tawny color should serve to recognize the species.

Polia (Mamestra) basivirida, new species.

Palpi scaled outwardly with black mingled with white; front and inside of palpi creamy; tuft of dark hairs between antennae with central light patch; collar dark, edged with light greenish; thorax and patagia largely light green, with slight intermixture of black; abdomen dark gray with anal tuft tinged with yellow laterally and ventrally; primaries dark purplish, basal portion to t.a. line bright green crossed by a geminate black subbasal line and with slight black shade on anal vein; t.a. line black, indistinctly geminate, the inner line tending to become obsolete; traces of white scaling between the lines, especially on veins and costa; the line itself outwardly inclined, angled just below costa, thence sinuate to anal vein from whence it curves strongly outwards to middle of inner margin; orbicular round, green, with black center; reniform large, similar in color, with black central lunule, preceded on costa by small greenish patch; t.p. line black, slightly dentate, well rounded about

reniform, closely approached to t.a. line on inner margin, shaded outwardly with white; subterminal area with green shading, consisting principally of large green patch opposite reniform, edged outwardly with black, fringes checkered.

Secondaries bright yellow with broad dark outer band and yellowish hairs on inner margin. Beneath, primaries dark, tinged with yellow around discal dot; secondaries as above with prominent discal spot and less dark shading along costa.

Expanse 27 mm.

Habitat.—Tucson, Ariz. 1 ♂. Type Coll. Barnes.

Unless the species should prove Mexican it appears markedly different from any described species of *Polia*; the yellow secondaries place it along with *secedens* Wlk. in a group by itself.

***Polia (Mamestra) hanhami*, new species.**

Palpi largely black outwardly, ochreous inwardly; antennæ ciliate in both sexes; front, collar, and thorax light brown sprinkled with blackish; collar crossed by black line; primaries light brown, sprinkled more or less with blackish; maculation rather indistinct; traces of a diffuse black geminate sub-basal line; an indistinct dark geminate t.a. line inclined slightly outwards, gently outcurved between the veins; orbicular round, outlined in black, often with lower portion filled with black; reniform indistinct, partially outlined in black; between orbicular and reniform a dark shade, perpendicular to costa, extends to a point just below reniform, forming at this point a large, prominent, round, dark patch, at times slightly diffuse; thence somewhat undulate to inner margin; before the dark patch more or less prominent traces of white on cubital vein, and beyond same some white scaling, at times quite prominent; t.p. line indistinct, single, black, outcurved beyond reniform thence proceeding very close to median dark shade; beyond t.p. line a row of black dots on the veins; s.t. line angled below costa, thence almost straight to anal angle; terminal space darker than remainder of wing; terminal line of black dots, veins with traces of white scaling, most prominent beyond cell; fringes dusky with basal row of yellowish dots at termination of veins; secondaries smoky with dark discal dot. Beneath light ochreous, sprinkled with dark scales; both wings with median black line, discal dots, and black terminal broken line; primaries at apex suffused with rosy.

Expanse 30 mm.

Habitat.—Duncans, Vanc. Is., B. C. 14 ♂♂, 21 ♀♀. Type Coll. Barnes; 1 Cotype, Nat. Mus.

This species has been apparently overlooked until now; we can at least find no description that would apply to it. The broad dark median shade and patch below reniform are the most prominent markings; the amount of white shading around the patch is variable,

at times very prominent, it may become quite obsolete. The dark sprinkling on the primaries may increase, especially in the female sex, until but little of the ground color remains; in such cases the maculation is much less distinct. It seems most nearly related to *nipana* Sm. and *montana* Sm. but is considerably larger and broader-winged than either of these species.

***Monima caloramica*, new species.**

Primaries and thorax in male deep red-brown, shaded occasionally with purplish; in female deep purplish, at times rather suffused with reddish. All markings obsolescent; orbicular and reniform are just distinguishable, former as a dark dot, latter as a broad lunular shade; traces of a geminate row of dots across wing in subterminal space. Secondaries suffused with rosy. Beneath largely rosy with small discal dot on secondaries.

Expanse 34.5 mm.

Habitat.—Redington, Ariz., Palmerlee, Ariz. 5 ♂♂, 9 ♀♀. Types Coll. Barnes, Cotypes Nat. Mus.

Very close to *mys* Dyar. Dr. Dyar has however kindly compared our specimens with his type and considers them distinct. In *mys* all markings are lacking; in our species the orbicular and reniform are recognizable, especially in the female sex. The antennæ of the male are shortly bipectinate, of female slightly ciliate.

***Monima hepatica*, new species.**

Palpi rosy; head purplish; tegulae reddish-purple; thorax and patagia purple-gray; antennæ in male very strongly pectinate except at tip. Primaries purple-gray somewhat suffused with reddish. All maculation indistinct; t.a. line single, outwardly inclined, broken by veins; t.p. line gently incurved below reniform, followed by parallel row of dots on the veins; orbicular a small dark spot; reniform an obscure shade; terminal area slightly darker than remainder of wing; costal edge rosy; fringes dusky with pale outer border and dark transverse line in outer third. Secondaries smoky, with rosy tinge to fringes. Beneath, primaries, smoky, with postmedian line and discal dot, costa slightly rosy; secondaries pale, sprinkled with rosy and with dark discal dot. Dark line on fringes of primaries more distinct than on upper side.

Expanse 34 mm

Habitat.—Redington, Ariz. 1 ♂. Type Coll. Barnes.

Very closely resembles in coloration the female of the preceding species; the strongly pectinate antennæ and the lack of rosy suffusion on upper side of secondaries easily serve to separate it. It is also very similar to *transparens* Grt. of which we have only seen the female specimens. If it were not for the fact that Hampson records

the male antennæ of this latter species as "serrate and fasciculate" we would be inclined to consider it to be this species; *hepatica* however has strongly bipectinate antennæ to near tip, stronger than in *flaviannula* Sm. As to whether there is a tuft on first abdominal segment or not we are unable to determine as the body is compressed; Hampson separates the two genera *Perigrapha* and *Monima* on this point; as far as our own personal experience goes it is a most unsatisfactory method of separation, only capable of being used with accuracy in absolutely fresh specimens, which, in Western material, are usually few and far between.

***Monima agravens*, new species.**

Female.—Eyes large, hairy; palpi and front reddish brown with mingled black hairs; antennæ serrate and fasciculate; thorax and primaries red-brown, suffused slightly with purplish, immaculate except for orbicular and reniform; former a dark spot, latter a dark shade, constricted in middle and filled with blackish scaling in lower portion; secondaries suffused with pink. Beneath pale pinkish with pink discal dots on both wings.

Expanse 33.5 mm.

Habitat.—Prescott, Ariz. 1 ♀. Type Coll. Barnes.

The species is so close to *caloramica* that one would fail to separate the two on mere color and maculation. The eyes however are much larger in *agravens*, and the antennæ are distinctly different in the two species, in *caloramica* being very finely ciliate, almost smooth, whilst in *agravens* they are plainly serrate and fasciculate. The primaries are also slightly more rounded at the apex in *agravens* than in the allied species. Such morphological differences warrant, in our opinion, the supposition that the two forms are distinct.

***Homohadena rustica*, new species.**

Palpi and tegulæ reddish brown, latter crossed basally and centrally by black bands and tipped with ochreous; front and thorax deep purplish brown; abdomen light gray; primaries reddish-brown, largely suffused with deep purplish brown; all maculation indistinct; t.p. line traceable as a pale curved line dotted with black on the veins; orbicular and reniform partially and obscurely outlined in blackish, or else entirely lacking; fringes smoky, with pale basal line followed by a darker one. Secondaries hyaline white, very slightly bordered with smoky-brown, which tends to follow course of veins backward from outer margin. Beneath white, hyaline on secondaries, sprinkled with brown on costa and outer margin, more so on primaries than secondaries; traces of a dark median line crossing both wings arising from a dark spot on costa of primaries; black, broken, terminal line, not reaching anal angle on secondaries; fringes as above.

Expanse 31 mm.

Habitat.—Babaquivera Mts., Ariz. 3 ♂♂, 1 ♀. Types Coll. Barnes.

We have placed this species under *Homohadena* as it appears to show as much trace of eyelashes as is usually present in this genus and in general appearance would fit in fairly well along with *incomitata* Harv. From this species it is easily separated by the lighter colored primaries and hyaline secondaries.

Euplexia brillians, new species.

Head, thorax and patagia purplish brown mixed with light brown. Abdomen gray, with a prominent tuft of purplish scales on dorsum of third segment; primaries in basal and subterminal portion pale yellow shaded with purplish, the median area being a dark bronze-green; subbasal line irregular, black, extending to anal vein; beyond it in the cell two slight black marks; below cubitus a black streak, shaded underneath with dark brown, merging into purple towards inner margin; small dark brown patch on inner margin near base; t.a. line evenly curved outwards, indistinct on costa, black, preceded by a narrow band of purplish shading; orbicular large, oval, oblique, open towards costa, outlined in black, filled with purple with some yellow tinges in costal portion; claviform, small, slightly outlined in black; reniform large, creamy, open towards costa, not outlined, but with some central dark shading, most prominent in costal portion; a dark shade, slightly darker than the ground color, extends from reniform to inner margin, t.p. line indistinct at costa, perpendicular to costa as far as vein 5, thence proceeding, at almost right angles, to vein 3 whence it is gently incurved to inner margin at about two-thirds from base; costa from t.p. line to apex shaded with dark; below this the whole subterminal space is light yellow, shaded inwardly with rosy, and forming a large semitriangular patch, extending as far as the angle of the t.p. line; from this point a dark olive shade extends to inner margin, leaving a large rosy yellow patch above the inner margin next the t.p. line, which is connected with the apical patch by a series of three pale yellow spots; subterminal line very close to margin, incurved opposite cell, with fairly distinct W mark, dark in the costal half, pale in the lower portion; terminal space shaded with dark blue; fringes dark, bordered basally with orange-yellow; secondaries suffused with smoky-brown, with traces of a post-medial line angled at the cubital branches; fringes pale ochreous.

Beneath primaries smoky, with pale yellow patch at end of cell, a sub-apical orange shade, bordered outwardly with yellow, and a dark blue terminal border; inner margin pale ochreous; secondaries ochreous, sprinkled along costa and apical portions of outer margin with dark purplish; with discal dot and indistinct postal-medial line.

Expanse 32 mm.

Habitat.—Redington, Ariz. 1 ♀. Type Coll. Barnes.

This beautiful species has the same general appearance as *lucipara*, it is however much more brilliantly colored, and can easily be distinguished by the large pale subapical patch.

Nocloa contrasta B. & McD.

Perigea contrasta B. & McD., 1910, Jour. N. Y. Ent. Soc., XVIII, 154.

A study of further specimens of this species convinces us that it was wrongly placed under *Perigea* when described. The front shows a small cup-shaped protuberance with central tubercle; this is entirely hidden by the squamation, and was thus overlooked by us in the single female before us at the time of description. It is closely related to *Nocloa dissimilis* B. & McD., both of these species having the frontal prominence much reduced and less prominent than in the other *Nocloa* species. We hesitate however to separate them on such grounds.

NEPTUNIA, new genus. (Type *pulchra* B. & McD.)

Palpi upturned, third joint semiporrect; fore tibiae unarmed, frons with prominent trilobate process with central lobe longer and broader than lateral ones, corneous plate below it, squamation appressed, scaly; abdomen without crests. Primaries with R_1 from cell, R_2 from areole, R_3 and R_4 stalked from apex of areole, R_5 from lower angle of same, M_1 from above center of discocellular, M_2 , M_3 and Cu_1 from around lower angle of cell. Cu_2 well removed; areole narrow. Secondaries with S.C. from cell before middle; R and M_1 from upper angle of cell, M_2 obsolescent from just below middle of discocellular, M_3 and Cu_1 stalked from lower angle of cell.

When describing *pulchra* (Jour. N. Y. Ent. Soc., XVIII, 158) we placed it doubtfully in the genus *Azenia* on account of the trilobate frontal process and obsolescent vein M_2 of secondaries, at the same time expressing the opinion that it possibly should come in what we erroneously termed the subfamily Acontiinae of Hampson in place of Erastrianae. The receipt of Vol. X of Hampson's Cat. Lep. Het. Brit. Mus., dealing with this subfamily, confirms us in our opinion and at the same time makes it necessary to create a new genus for the reception of *pulchra*. It is closely related to *Tornacontia* Sm. but the strongly trilobate frontal process in contradistinction to the shovel-shaped process of this latter genus will easily distinguish it.

***Phiprosopus pallens*, new species.**

Palpi pale yellow; head, thorax, and abdomen whitish; primaries pale ochreous, shading into darker towards outer margin, two very faint brown points in cell, arranged parallel to costa; a pale line extending obliquely from apex to inner margin bordered inwardly slightly with brown; secondaries and underside of both wings pale ochreous, immaculate.

Expanse 35 mm.

Habitat.—Babaquivera Mts., Ariz. 1 ♂. Type Coll. Barnes.

Epizeuxis parvulalis, new species.

Thorax and primaries pale smoky, latter shiny, crossed by two pale indistinct dentate bands, one near base of wing, the other through center; secondaries whitish, immaculate. Beneath whitish shaded with fuscous towards apex of primaries.

Expanse 18 mm.

Habitat.—Santa Catalina Mts., Ariz. 1 ♂. Type Coll. Barnes.

Belongs in the *lubricalis* group, but can readily be separated by its small size.

Family GEOMETRIDÆ.

Hydriomene mediodentata, new species.

Female.—Primaries dark steel gray with no traces of maculation; a distinct scale-tooth about center of inner margin. Secondaries white, rather hyaline, slightly smoky outwardly, apex color of primaries. Beneath glossy white, primaries shaded with fuscous.

Expanse 26 mm.

Habitat.—Palmerlee, Ariz. 1 ♀. Type Coll. Barnes.

Mr. Grossbeck, who has seen the specimen, pronounces it to be new. The prominent tooth on inner margin of primaries would easily distinguish it from other members of the genus; the venation appears to be typically Hydriomenid.

Family NOTODONTIDÆ.

URSIA, new genus. (Type *noctuiformis* sp. nov.)

Palpi minute, proboscis lacking; head with prominent crest above eyes; thorax slightly crested; antennæ in male with long pectinations, except at extreme tip which is naked; mid and hind tibiæ with single pair of apical spurs; primaries narrow, elongate, costal margin straight, outer margin slightly convex; vein R_1 from about center of cell; R_2 – R_5 stalked from apex of small areole, R_2 from before R_5 , R_3 and R_4 on long stalk, latter to apex of wing; R_5 to well below apex; M_1 from areole just below origin of radial branches; M_2 from center of discocellular, extending very faintly for a short distance into cell; M_3 and Cu_1 separate from around lower angle of cell; Cu_2 opposite R_1 . Secondaries elongate, with frenulum, vein S–C approaching cell towards its center, but well separated at base; R and M_1 stalked from upper angle of cell; M_2 very faint but developed outwardly; M_3 and Cu_1 separate from around lower angle of cell, Cu_2 from beyond center of cell.

U. noctuiformis, new species.

Head and thorax gray, composed of mixed brown and white hair-like scales, vestiture rough; primaries strigate in appearance, dark gray, shaded with whitish; beyond the cell, extending from vein M_3 to below Cu_2 is a

prominent white transverse line, very slightly angled inwardly on Cu_2 and continued to inner margin by a faint dark strongly incurved shade; from the upper end of this line a darkish shade extends to apex of wing, containing several black dashes on veins; terminal area beyond white transverse line and below apical dark shade considerably lighter than remainder of wing, with indistinct white dashes between the veins; traces of a brown outcurved line across cell and a small dark discal dash, fringes slightly checkered. Secondaries smoky, lighter towards inner margin. Beneath dark smoky, with traces of white margin along apical portion of costa and outer margin of primaries; secondaries lighter basally.

Expanse 25 mm.

Habitat.—Yavapai Co., Ariz. (May 21-31). 4 ♂♂. Types Coll. Barnes.

We have created a new genus for this species as we have been unable to find any in Schaus' Revision of Am. Notodontidae which at all correspond; the use of the key would leave us a choice between

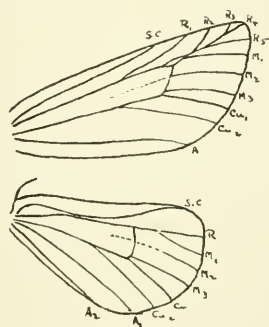


FIG. 1. Venation of *Ursia noctuiformis* sp. nov.

Antiora and *Anurocampta*, neither of which however agrees in venation with our species. Mr. Grossbeck, who has seen the species, was at first of the impression it belonged in the Geometridae, but on a careful study of the venation informs us that it should probably come in the Notodontidae.

Family PYRALIDÆ.

Subfamily PYRAUSTINÆ.

Lipocosma albibasalis, new species.

Palpi and head scaled with brownish; thorax and abdomen white, latter with brown dorsal scaling; primaries, basal half pure white with a minute brown dot on costa near base and a few dark scales on inner margin; remainder of wing brown, shaded in terminal area with white; line of demar-

cation between two colors very sharp, almost perpendicular, irregularly dentate, inclined somewhat inwardly at inner margin, beyond the cell a prominent round blue-black scale patch, with several minute black dots below it; a submarginal black line, well outcurved from costa around scale patch, in lower portion irregularly dentate, shaded slightly inwardly with whitish in costal half; a broken black terminal line preceded by more or less distinct white patches; fringes brown. Hind wings white, with two patches of raised brown and blue-black scales near to and parallel with inner margin; a brown suffusion more or less surrounds the patches and from a point between the two a black wavy line is traceable to inner margin but does not extend to costa; inner margin scaled with brown near anal angle; black terminal line in central portion of outer margin; fringes white shaded with brown, especially towards anal angle.

Beneath whitish with the markings of upper side more or less distinctly repeated; median and terminal dark lines of secondaries extending to costa, often interrupted.

Expanse 13 mm.

Habitat.—San Diego, Calif. 21 specimens. Type Coll. Barnes.

Subfamily EPIPASCHINÆ.

Tallula fieldi, new species.

Palpi and head brown; thorax white with blackish scaling; primaries white; a small basal patch of brown and black scales; a broad brown band across middle portion of wing bordered outwardly by a fine white sinuate line; anterior margin of band rather dentate, defined by some black scaling; costal portion of band scaled with black; dark spot on costa beyond white line; a subterminal white line slightly outcurved opposite cell, bordered inwardly narrowly with black at costa, the border rapidly increasing in width, so that the whole lower half of area between the two white lines is blue-black scaled with brown, leaving only the costal half white; a large apical brown-black spot; a broken terminal dark line; fringes white.

Secondaries dusky, darker towards apex.

Beneath smoky-brown with white fringes; secondaries lighter towards inner margin; primaries with white spot on costa near apex.

Expanse male 18 mm., female 20 mm.

Habitat.—San Diego, Calif. (G. H. Field). 6 ♂♂, 3 ♀♀. Types Coll. Barnes.

The species, which is closely related to *atrifascialis* Hlst., may be distinguished by the broad extent of the median dark shading. In *atrifascialis* the whole of the median area practically is white, whilst in *fieldi* the white is confined to an irregularly shaped costal patch. We take pleasure in naming this species after the collector Mr. G. H. Field.

NOTES ON THE MYRMECOPHILOUS BEETLES OF THE GENUS *XENODUSA*, WITH A DESCRIPTION OF THE LARVA OF *X. CAVA* LECONTE.¹

BY WILLIAM MORTON WHEELER,

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Our knowledge of the singular beetles of the North American genus *Xenodusa*, in contrast with that of the European species of the closely allied genera *Lomechusa* and *Atomeles*, increases very slowly. This is unquestionably due to the much greater scarcity and more local distribution of the species of *Xenodusa*. In a paper published in 1907² I reviewed the scattered observations of other authors on these beetles and added a few of my own. After four years I am able to make a further slight contribution in the form of a description of the larva of *X. cava*, together with a few notes on the hosts of this and of some of the western species.

Wasmann has shown that *Lomechusa strumosa* is homœcious, or has only one host, the typical form of *Formica sanguinea*, with which it lives throughout the year, whereas the species of *Atomeles* and *Xenodusa* are heterœcious, since they breed during the summer in the nests of *Formica* but hibernate with ants of a different genus. The winter host in the case of *Atomeles* is *Myrmica rubra* or some one of the closely allied species (*scabrinodis*, *levinodis*, *rugulosa*, etc.) which were formerly regarded as mere subspecies. *Xenodusa*, however, winters in the nests of *Camponotus* species. The definitive and almost certainly the primitive host is, therefore, in both genera, *Formica*, while the winter host is a later or secondary acquisition. The genus *Lomechusa* probably represents a very primitive condition so far as its relation to a single host is concerned, though in other respects it certainly represents a more advanced stage of parasitism or of dependence on its host.

¹ Contributions from the Entomological Laboratory of the Bussey Institution of Harvard University, No. 41.

² The Polymorphism of Ants, with an Account of Some Singular Abnormalities Due to Parasitism. Bull. Amer. Mus. Nat. Hist., XXIII, 1907, pp. 1-93, pls. I-IV.

I have been unable as yet to find *X. cava*, during its breeding season, with any ant except *Formica schaufussi* var. *incerta*, but McCook³ claims to have taken it with *F. exsectoides* in Pennsylvania, and Muckermann⁴ believes that it occurs with *F. sanguinea* subsp. *rubicunda* in Wisconsin, because in the nests of this ant he found pseudogynes comparable to those described by Wasmann from nests of the typical *F. sanguinea* infested with *Lomechusa strumosa*.

Concerning six larvæ of *X. cava* which I found July 1, 1905, in a nest of *F. incerta* at Colebrook, Conn., I published the following note in my former paper: "They were clinging to the lower surface of the stone covering the nest. I transferred them to an artificial nest together with as many of the ants as I could capture. The larvæ associated themselves with the brood which the ants had collected in the cavities of the damp sponge in the dark chamber of the nest. They walked about but little and very clumsily as their legs seemed to be incapable of much movement at the strongly flexed articulation between the femora and tibiæ. They were frequently seen in the act of begging the ants and one another for food. At such times they raised their fore feet and stroked the head of the ant or fellow larva. Although the ants usually responded very willingly to this solicitation, the liquid food thus received seemed to be insufficient, for one morning I saw one of the *Xenodusa* larvæ seize and devour an ant larva about 3 mm. in length. On July 7 two of the *Xenodusa* larvæ had disappeared (eaten by the ants?) and the remaining four had become somewhat inactive after having grown appreciably during their week's confinement in the artificial nest. Fearing that the ants might devour the remaining parasites, and concluding from their size that they must be nearly ready to pupate, I removed them from the nest and embedded them in some earth. This proved to be disastrous as I had not taken the precaution to sterilize the earth which must have contained some predaceous insect. At any rate, I could find no traces of the larvæ when I carefully examined the earth several days later."

Diligent search for *Xenodusa* larvæ since these remarks were written, was fruitless till June 13, 1910, when I found a single speci-

³ Mound-making Ants of the Alleghenies, their Architecture and Habits. Trans. Amer. Ent. Soc., VI, 1877, pp. 253-296, pls. I-VI

⁴ *Formica sanguinea* subsp. *rubicunda* Em. and *Xenodusa cava* Lec. Ent. News, Dec., 1904, pp. 339-341, pl. XX.

men clinging to the lower surface of a stone covering a *F. incerta* nest at Forest Hills, Mass. This specimen, which is represented in the accompanying figure, measures nearly 6 mm. in length and is probably about one-half or two-thirds grown. Its milk-white body is broad and flat in the middle but narrowed at the anterior and posterior ends which are turned up. Eyes are absent. The antennæ and legs are well-developed, the last abdominal segment slender and

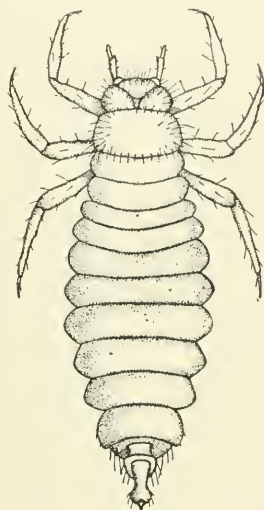


FIG. 1. Larva of *Xenodusa cava* Lec.

of a peculiar shape. The vertex of the head is deeply and triangularly impressed in the middle. There are a few delicate, scattered hairs on the legs, antennæ, head, pronotum, venter and terminal abdominal segments; on the remaining portions of the body the hairs are very short, sparse and inconspicuous.

Comparison of this larva with that of *Lomechusa strumosa* which has been described by Wasmann⁵ and which I have taken in numbers in *F. sanguinea* nests in the Alps, shows many striking differences. The *Lomechusa* larva is more slender and cylindrical, its antennæ are reduced to mere papillæ, its legs are very short and feeble, its terminal abdominal segments are conical and the whole body is in-

⁵ Vergleichende Studien über Ameisen- und Termitengäste. Tijdschr. v. Ent., XXXIII, 1890, pp. 27-96. 1 pl.

vested with rather dense, short hairs. The impression of the vertex is shallow.⁶

I have not seen the larva of *Atemeles*, but that of *A. paradoxus* from nests of *F. rufibarbis* was long ago described and figured by Wasmann.⁷ His figures show that this larva, though it has somewhat longer legs and antennæ than the *Lomechusa* larva, nevertheless resembles it much more closely than it does the larva of *Xenodusa*. Wasmann states that the *Lomechusa* larvæ are "still more passive in their behavior and almost never use their legs, and therefore play the rôle of ant-larvæ more perfectly than do the larvæ of *Atemeles*." That the *Atemeles* larvæ walk about rather easily is evident also from some remarks in a paper by Schmitz.⁸ This author and more recently Wasmann⁹ have shown that *Atemeles* larvæ when ready to pupate, do not have to be buried by the ants, like the very passive *Lomechusa* larvæ, but are able to crawl into the soil and pupate of their own free will. There can be little doubt that this is also true of the *Xenodusa* larva, for its very high structural organization, together with the few notes on its behavior quoted above, show that it must lead a much more independent life in the colonies of its host than do the larvæ of either of the European genera. This independence and the much less perfect resemblance to the ant-larva may, perhaps, explain why the species is so scarce and sporadic. In other words, *F. incerta*, though a very cowardly ant and the regular host of such synœketes as *Microdon tristis*, *Coscinoptera dominicana* and *Cremastochilus castanea*, and such social parasites as *Polycergus lucidus*, *Formica consocians*, *F. sanguinea* subsp. *subintegra* and *rubicunda*, is probably not easily deceived into rearing and cherishing the parasitic beetle larvæ which so ruthlessly devour its brood. That this ant may be occasionally deceived is, however, proved by the abundant occurrence of pseudogynes in certain colonies, as I have shown in my paper on the polymorphism of ants.

⁶ I have given a figure of this peculiar larva in my book: "Ants, their Structure, Development and Behavior," 1910, p. 401.

⁷ Beiträge zur Lebensweise der Gattungen *Atemeles* und *Lomechusa*. Tijdschr. v. Ent., XXXI, 1888, pp. 245-328.

⁸ Die Ursachen der Doppelwirtigkeit bei *Atemeles*. Deutsch. Ent. Nat. Biblioth., I, Nos. 1 and 2, 1910, pp. 6-7, 13, 14.

⁹ Zur Doppelwirtigkeit der *Atemeles*. Deutsch. Ent. Nat. Biblioth., I, Nos. 7 and 8, 1910, pp. 55, 56; 62-64.

According to Wasmann¹⁰ "the species of *Xenodusa*, in the shape of the labium, are intermediate between *Atemeles* and *Lomechusa*. In other respects also the nearctic genus *Xenodusa* connects, so to speak, the two old world genera, in so far namely, as some of the species (especially *X. caseyi*) resemble *Atemeles* in thoracic structure, while others (*X. sharpi*) are more like *Lomechusa*." He adds, however, that notwithstanding these intermediate characters, "we are unable to regard *Xenodusa* as a connecting link between *Atemeles* and *Lomechusa*, since the much elongated shape of the antennæ and legs indicates a peculiar direction of development, which is not observable in the two old world genera and is probably to be interpreted as an adaptation to the relatively very large hosts of *Xenodusa* (*Camponotus*, *Formica*)."¹¹ The larval characters above described certainly seem to confirm Wasmann's view of the peculiar and independent developmental trend of the genus *Xenodusa*, and the long legs and antennæ of the adult beetle are, indeed, in all probability, an adaptation to its hosts, since these organs are very long in the *Camponoti* with which it passes the winter and in *F. incerta*, which, like the other forms of the *pallide-fulva* group, has much more slender legs and antennæ than any of our other *Formicæ*. The great length of the appendages in the larva must be directly correlated with their unusual length in the imaginal beetles.

The recorded winter hosts of *X. carya* are *C. herculeanus* subsp. *pennsylvanicus* and *C. ligniperda* var. *novboracensis*. To these must be added *C. pennsylvanicus* var. *ferrugineus*, as Dr. A. Fenyès has shown me one specimen of the beetle taken in a nest of this ant at Bloomington, Indiana. Still another host has been recently discovered by Messrs. W. Reiff and E. H. Strickland, April 19, 1911. These young men found a couple of the beetles in two colonies of *C. castaneus* subsp. *americanus* at Norwood, Mass. This being a ground-inhabiting *Camponotus*, would seem to be a more natural winter host than the various wood-inhabiting forms of *C. herculeanus* with which it has always been taken heretofore.

On May 6, 1911, I took a specimen of *X. carya* resting on a stump near the top of Great Blue Hills, near Boston, Mass. As there was no *Camponotus* colony in the stump, nor within several yards of

¹⁰ Zur Biologie und Morphologie der *Lomechusa*-Gruppe. Zool. Anzeig., 1897, pp. 463-471.

the spot, the beetle must have been in the act of migrating to a colony of its summer host, *F. incerta*, which is very abundant in the same region. The beginning of May may therefore be set down as the time of the spring migration. The migration from the *incerta* back to the *Camponotus* nests takes place, in all probability, during the last week of July or first week of August, since I have a record of finding a very fresh and light-colored specimen of the beetle in a nest of *C. noveboracensis* at Colebrook, Conn., July 28, 1910. These dates indicate, therefore, that the breeding period of *X. cava*, or its life with the definitive, or summer host, covers a period of only three months, and that it spends the remaining nine months of the year with its intermediate host.

An examination of Dr. A. Fenyes's collection of Aleocharinæ during the past winter, enables me to add the following notes on the hosts of two of the western species of *Xenodusa*:

1. The type specimen of *X. angusta* in this collection was taken from a colony of *Camponotus fallax* subsp. *discolor* var. *clarithorax* living in a gall of *Andricus pomiformis* on live oak (*Quercus agrifolia*) in the Gran Arroyo Seco at Pasadena, California. The *Camponotus* is therefore the winter host of this small *Xenodusa*; its summer host is probably *F. pilicornis*, the only *Formica* I could find in the portion of the Arroyo in which the beetle was captured.

2. Dr. Fenyes showed me several specimens of *X. montana* which he had taken from nests of *C. levigatus* at McCloud, Castle Crag and Sissons, Cal., and a specimen of the same beetle found in a colony of *C. herculeanus* var. *modoc* at Tahoe City in the same state. Schwarz had previously recorded *C. levigatus* as a host of *X. montana*, and Wirtner has found it living with its summer host, *F. subpolita*.

From the following table, which summarizes our present knowledge of the hosts of our five *Xenodusæ*, it will be seen that both hosts are known of only two of the species:

1. *X. cava* Leconte.

Summer hosts: *Formica schaufussi* var. *incerta* (Wheeler); *F. exsectoides* (McCook); ?*F. sanguinea* subsp. *rubicunda* (Muckermann).

Winter hosts: *Camponotus herculeanus* subsp. *pennsylvanicus* (Schwarz, Blanchard, Pricer, Brues, Wheeler) and its var. *ferrugineus* (Fenyes); *C. herculeanus* subsp. *ligniperda* var. *noveboracensis* (Schwarz, Wickham, Muckermann, Wheeler); *C. castaneus* subsp. *americanus* (Reiff and Strickland).

2. *X. montana* Casey.*Summer host: Formica subpolita* (Wirtner).*Winter hosts: Camponotus levigatus* (Schwarz, Fenyès); *C. herculeanus* var. *modoc* (Fenyès).3. *X. caseyi* Wasmann.*Summer host: Formica subpolita* (Wirtner).4. *X. sharpi* Wasmann.*Winter host: Camponotus auricomus* (Wasmann).5. *X. angusta* Fall.*Winter host: Camponotus fallax* subsp. *discolor* var. *clarithorax* (Fenyès).

AN ANT-NEST COCCINELLID (BRACHYACANTHA QUADRIPUNCTATA MELS.).¹

BY WILLIAM MORTON WHEELER,

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Early in May, 1910, while I was collecting on the rocky southern slope of Great Blue Hill near Boston, Mass., my curiosity was aroused by some snow-white insects, resembling gigantic Coccids, in several nests of *Lasius umbratus* var. *aphidicola*. From hasty examination I conclude that these insects, which were moving about slowly or resting among the root-Coccids and root-Aphids so abundant during the spring months in the *aphidicola* nests, must be predaceous Coccinellid larvæ. Unfortunately, the vial in which they were collected dropped from my pocket and was lost before I could examine them at my leisure.

May 6, 1911, on returning to the same locality, I succeeded in finding ten of the larvæ in two nests of the same ant. Each of these nests also contained a large number of root-Coccids. Larvæ, ants and Coccids were taken home and placed in an artificial nest. The larvæ, when first found, were covered with dense tufts of delicate white wax, but these broke off in transit through rubbing against particles of earth, so that the specimens were almost denuded when they were installed in the nest. New tufts of wax, however, at once began to be secreted, and by May 15 the larvæ had the appearance

¹ Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 43.

shown in the accompanying figure. During this time they crawled about the nest without being molested or even noticed, and the number of Coccids in the nest suffered no diminution. By May 17 they had ceased to move and were huddled together preparatory to pupation. Whether they fasted for lack of their proper food, which probably consists of Coccid eggs, or because they had already attained their full growth when I confined them in the nest, I am unable to say, but the latter is the more probable explanation.



FIG. 1. Seven larvæ of *Brachyacantha 4-punctata* Mels. $\times 2\frac{1}{2}$.

The adult larva, covered with the waxy tufts, measured about 10 mm.; but after these had been dissolved away in chloroform, its body was only 6-7 mm. long, and was of a whitish or pinkish yellow color. It differed conspicuously from our common Coccinellid larvæ, not only in this lack of pigmentation, but also in having very much shorter and feebler legs, a much smaller head, a more obese and elliptical abdomen and in lacking the eyes and the rows of robust spiny processes along the sides and in the mid-dorsal region of the thorax and abdomen. The intersegmental constrictions were pronounced and each segment had a deeply impressed transverse line in the middle of its dorsal surface. The body was covered with delicate flexuous hairs, which varied in length but were conspicuously

long on the head and on the projecting lateral border of each segment. These hairs probably help to support or bind together the waxy secretion.

By May 22 some at least of the larvæ had pupated. This could not be determined by superficial examination, because the larval cuticle was not shed but merely separated from the underlying hypodermis, and the pupa was formed within the larval cuticle, which was not even ruptured in the middorsal line. It rested on the soil and retained intact its tufted covering of white wax.

June 15, on returning from a vacation, I found that the ants and Coccids had died some time during my absence and that a beautiful Coccinellid beetle, spotted with yellow and with iridescent blue-green eyes, had emerged from one of the pupæ and was running rapidly about the nest. Four more of these beetles hatched June 16, 17, 20 and 22. The pupal period therefore extends over a month and is probably not much shorter than larval life, unless the young larvæ hatch in the fall of the year.

Although it was evident that the beetle was a *Brachyacantha*, I had difficulty in deciding on its specific identity. I therefore sent it to our acknowledged authority on the Coccinellidæ, Mr. Charles Leng, who kindly wrote me as follows: "The Coccinellid beetle is *Brachyacantha 4-punctata* Mels. Melsheimer described the female under this name and later in the same paper described the male as *basalis*. The male which you send has two spots at the base of the elytra, the female only one; she lacks the humeral spot. Crotch regarded the insect as a variety of *ursina* but Mulsant, Gorham and Casey dissent from this view, and the differences in abdominal structure support their opinion. It will be treated as a distinct species in my forthcoming paper."

Turning to the literature, I find that the larva of this or of a very closely related *Brachyacantha* was long ago seen in ant nests by Dr. John B. Smith.² He says: "It would be supposed that the ants would be very careful to keep out all enemies of these their domestic animals (aphids), but there is one species that gets in and remains in undisturbed. It is the larva of a common "lady bird," *Brachyacantha ursina*. Unlike the larvæ of Coccinellids that prey

²Ants' Nests and their Inhabitants. Amer. Natur., XX, 1886, pp. 679-687.

on arboreal species, this is not brightly colored but sordid whitish-yellow. It is of the usual form of these larvæ, but secretes a waxy substance that exudes in long strings and gives the insect the appearance of being covered with cotton or hoar frost. This secretion seems to be much more palatable to the ants than that of the *Pemphigus*, and they unconcernedly see the Coccinellid feasting upon the former apparently concluding that the flavor is improved by passing through the latter." The meaning of the last sentence is not clear, unless Smith actually believed that the ants feed on the waxy secretion of the *Pemphigus* and *Brachyacantha* larvæ!

Schwarz³ says that the larva of *Brachyacantha ursina* "is abundant near Washington, D. C., in the colonies of *Lasius claviger* preying upon the *Pemphigus* domesticated by the ants. Whether or not this is the normal habit of the larva must be left to future observations." Whether the larva mentioned by these two authors is that of the true *B. ursina* or of *B. 4-punctata* which, as Leng says, was supposed by Crotch and others to be merely a variety of *ursina*, I am, of course, unable to decide.

Mann⁴ has very recently described and figured what is unquestionably the larva of a Coccinellid closely related to *Brachyacantha* from a nest of *Formica camponoticeps* at Wawawai, Washington. This larva measured 6-7 mm. in length and, as the figure shows, differs from my larvæ of *B. 4-punctata* only in having the head proportionally larger, the body somewhat more cylindrical and in being "covered densely with a white powder," instead of with long, dense tufts of wax. This last difference, however, may be unessential since rubbed *Brachyacantha* larvæ have the appearance of being merely powdered with the waxy secretion.

The only Coccinellid larvæ which I find recorded as living in ant-nests in the old world are *Scymnus formicarius* Muls., cited by Wasmann⁵ as having been found in the imaginal stage with *Formica rufa* in eastern Siberia, and *Hyperaspis reppensis* which was observed

³ Myrmecophilous Coleoptera found in Temperate North America. Proc. Ent. Soc. Wash., I, No. 4, 1890, pp. 237-247.

⁴ On Some Northwestern Ants and their Guests. Psyche, XVIII, No. 3, 1911, pp. 102-109, 3 figs.

⁵ Kritisches Verzeichniss der myrmekophilen und termitophilen Arthropoden. Berlin, 1894, p. 161.

by Silvestri⁶ in the nests of *Tapinoma erraticum nigerrimum* near Naples. The larva of the *Hyperaspis* feeds on the myrmecophilous *Tettigometra impressifrons* and *costulata* which live in the nests of this ant. It remains in the pupal stage from 20-30 days, during which time it is attached, together with its last larval cuticle, to the lower surface of the stones covering the nests or to leaves or sticks that may happen to be in the superficial chambers. The adult beetle appears in June. It clings to the stones during the warm hours of the day, with its feet and antennæ withdrawn under the thoracic and elytral borders, but when disturbed it runs about briskly. When it meets an ant it stops suddenly and attaches itself to the stone. The ants may endeavor to seize it by the sides of its body but seem never to be successful in holding it in their jaws. The larvæ are treated with indifference. According to Silvestri, *H. reppensis* is to be regarded as a synækete having no direct relations with its host, but preying on the truly myrmecophilous *Tettigometra*. Evidently the relations of *Brachyacantha 4-punctata* to its host, *Lasius aphidicola*, and to the root-Coccids and root-Aphids so assiduously cherished by this ant, are precisely similar.⁷

The close resemblance of the *Brachyacantha* larvæ to certain Coccids, a resemblance which must be extreme during the younger stages, would seem, at first sight, to be due to mimicry and to be interpretable as a protection from the mandibles of the ants. It is probable that this protection actually obtains, but when we stop to consider that some Coccinellids, which never live in ant-nests, but feed on the eggs of Coccids that live exposed on leaves and branches, nevertheless have larvæ very similar to those of *Brachyacantha*, we must decline to see in the waxy tufts of the latter any special adaptation developed for the purpose of enabling them to live in the nests

⁶ Contribuzioni alla Conoscenza dei Mirmecofili. I. Osservazioni su alcuni Mirmecofili dei dintorni di Portici. Ann Mus. Zool. R. Univ. Napoli, N.S., I, No. 13, 1903, 5 pp.

⁷ Since the foregoing remarks were written I have found that Donisthorpe (Fourmis et leur hôtes. 1er Congr. Internat. d'Entomologie, Bruxelles, 1910, pp. 199-208, Pl. XI) has found *Coccinella distincta* in the mounds of *Formica rufa* or in their vicinity in England. The beetle preys on the aphids in the ant-nests. "When it is attacked by the ants it withdraws its legs and antennæ and feigns death; at such times the mandibles of the ants cannot grasp its smooth elytra."

of *Lasius aphidicola*. The figures published by Howard,⁸ Sanders⁹ and Forbes¹⁰ of the larva of *Hyperaspis signata*, which feeds on the eggs of the cottony maple scale (*Pulvinaria innumerabilis*), show that it is covered with tufts of delicate white wax and closely resembles the *Brachyacantha* larva. The larva of *H. binotata*, which preys on the same scale, has, judging from Sanders' figure, much shorter tufts of wax than *H. signata*. Howard says of the latter: "The striking likeness of the larvæ of the *Hyperaspis* to a mealy bug will at once be noticed. Were it feeding upon mealy bugs instead of upon Pulvinarias (and it frequently does feed upon mealy bugs) it would at once be evident that we have here a clear case of what Professor Poulton calls 'aggressive mimicry.'" It is clear, however, that even the theory of aggressive mimicry is inapplicable to this particular case, since the Coccids are neither able to see nor to escape from the enemies of their eggs. Is it not simpler to assume that these Coccinellid larvæ secrete an abundance of wax simply because they feed on organisms which, as shown by their secretions in turn, contain large quantities of substances that are readily convertible into wax?

Still another Coccinellid larva closely resembling *Brachyacantha* is that of the Australian *Cryptolamius montrouzieri*, which in its native country feeds on waxy Coccids of the genera *Dactylopius* and *Eriococcus* and when introduced into Hawaii proved to be very useful in destroying the *Pulvinaria psidii* of the coffee plantations. Lounsbury's figures of this Coccinellid, reproduced by Marchal¹¹ indicate that its pupa is formed within the larval skin exactly as in *Brachyacantha*.

⁸ Beneficial Work of *Hyperaspis signata* (Abstract), Proc. Twelfth Ann. Meet. Assoc. Econ. Ent., Bull., No. 26, N.S., U. S. Dept. Agric., 1900, pp. 17, 18, 1 fig.

⁹ The Cottony Maple Scale, Circ. No. 64, U. S. Dept. Agric., 1905, 7 pp., 4 figs.

¹⁰ Twenty-fourth Report of the State Entomologist on the Noxious and Beneficial Insects of the State of Illinois. Bloomington, 1908, 168 pp., 11 pls., 8 text figs.

¹¹ Utilisation des Insectes Auxiliaires Entomophages dans la Lutte contre les Insectes nuisibles à l'Agriculture. Ann. de l'Inst. Nat. Agron. (2), VI, 1907, pp. 1-74, 26 figs.

NOTES ON THE HYMENOPTERA CHALCIDOIDEA, WITH DESCRIPTIONS OF SEVERAL NEW GENERA AND SPECIES.

BY A. A. GIRAULT,

BRISBANE, AUSTRALIA.

Family PTEROMALIDÆ.

Subfamily SPHEGIGASTRINÆ.

Tribe *Sphægigastrini*.

URIOS, new genus.

Female.—Eyes dark red, margined with ocher, ovate, moderate in size; whole head reticulated, an ochreous area caudad of and bordering each eye; sparse, rather long white hairs on head; antennæ inserted about in the middle of the face, distinctly above an imaginary line drawn between the ventral ends of the eyes; occipital margin of vertex obtuse; lateral ocelli very far from the eye margins; antennal bulbs separated for half their own width, distant from the eyes; antennal scobe barely indicated just above the insertion, the face shallowly concave above bulbs; beneath them crossed by a broad, somewhat irregular ochraceous band which also extends somewhat above them. Cephalic ocellus nearly in cephalic aspect, the scape reaching above it. Head subtriangular, not much wider than the thorax. Clypeus not conspicuous. Maxillary palpi 4-jointed, the apical joint long, equal to the two preceding joints; labial palpi 3-jointed.

Both mandibles tri-dentate, the third tooth shortest, broadly truncate (but its apical margin slightly emarginate, giving the appearance of two weak teeth on each side), the two outer teeth subobtuse, distinct but not strong, the outer the longest (of itself short).

Antennæ 12-jointed, subclavate or cylindrical and enlarging gradually to end of club-scape; pedicel, one large ring-joint, 5 funicle joints, and a 4-jointed club; ring-joint long but still wider, distinct; scape obclavate, with its bulb about thrice the length of the usual obconic pedicel, the latter subequal in length to the rather long first funicle joint; remaining funicle joints shortening distad and slightly widening, the distal one somewhat wider than long, somewhat less than half the length of the first; club conic-ovate, not as long as the scape, the joints subquadrate excepting the last, which is very small, resembling a large tubercle or button. Pubescence of antenna consists of stiff, rather sparse, rather long bristles. Funicle joints narrowed somewhat proximad, their disto-lateral angles acute.

Legs normal, the tarsi 5-jointed, the proximal joint long, the tibial spurs single, not more than a fourth the length of the first tarsal joint yet moder-

ately strong, straight, those of the cephalic legs forked; all femora swollen moderately, simple, the tibiae straight, slender; proximal joint of cephalic tarsi shorter.

Thorax rather long, the pronotum especially long, from dorsal aspect nearly transverse-quadrate and broader than the rest of the thorax, produced cephalad into a neck; mesonotum with distinct, rather deep parapsidal furrows and trilobed, the scutum longest of the lobes, convex and rounded off cephalad, its cephalic margin conversely curved and the sclerite saddle-shaped; the parapsides short, lobelike, their axes cephalo-laterad, convexly rounded. Scutellum not very large, oval and convex, without transverse or longitudinal grooves; metathorax slightly convex, somewhat longer than the scutellum, with a median groove, its spiracle moderate in size, circular; metathorax ending in a short, hoodlike neck. Pro- and mesonotum faintly finely reticulated, the metanotum roughly so, nearly punctate. Of carinae, on the metathorax there is a short, curved lateral carina leading from the side of the hoodlike neck half way to the spiracle. A spiracular sulcus leads from the spiracle and is nearly similar to the median groove.

Abdomen with a distinct but very short petiole, pointed conic-ovate and at base ventrad acutely produced, somewhat longer than the head and thorax combined, the ovipositor not exerted. Second abdominal segment longest, covering about a fourth of the abdomen, the others moderately short, gradually shortening caudad, the caudal margins in the dorsal aspect straight. Abdomen with scattered pubescence. Wings hyaline, very minute.

Type.—The following species:

***Urios vestali*, new species.**

Normal position.

Female.—Length, 2.45 mm.

General color shining black, the head colored as described in preceding, the body marked with ochreous as follows: Most of pronotum suffused, disk of scutellum and a large area on each side of the median groove of the metanotum, most of meso- and metapleurum, most of caudal coxae, the knees and tips of tibiae; tarsi yellowish, also extreme tip of abdomen; distal tarsal joint black.

From a single specimen, $\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.

Male.—Unknown.

Described from a single female specimen taken from the nest of an ant by A. G. Vestal in Illinois. The genus is nearly wingless. Captured in May.

Type.—Accession No. 45,066, Illinois State Laboratory of Natural History, Urbana, Illinois, one female on a tag, plus two balsam slides (♀ head + appendages and ♀ antenna).

Family ENCYRTIDÆ.

Subfamily ENCYRTINÆ.

Tribe *Arrhenophagini*.

Genus **ARRHENOPHAGUS** Aurivillius.

Arrhenophagus chionaspidis Aurivillius.

I add the following redescription in order to call attention to certain probable errors in former descriptions and to make additions.

Female.—Small for the group in size and normal in aspect, but the tarsi are only 4-jointed. Legs normal, all tarsi 4-jointed, the apical joint the longest, the rest short, subequal in length, about half the length of the apical joint, the proximal joint, however, somewhat longer than the second and third joints. *Tibial spurs not long or large*, slightly longer than the proximal tarsal joints. Antennæ 7-jointed—scape, pedicel, two ring-joints (or two small funicle joints), and a *3-jointed club*; pedicel longer than the combined lengths of the two ring-joints, the latter connate with the club, the second wider but shorter than the first; first and second club joints subequal, one-third longer than the pedicel and nearly one-half longer than the apical club joint, which is conic (apparently and casually the antennæ are 3-jointed—scape, pedicel and *unjointed club*, the pedicel being much the shortest of the three, the scape and club subequal in length, but the latter stouter); antennæ inserted below the middle of the face; flagellum club-shaped, bearing uniform, short white hairs rather closely placed. Mandibles moderately short, acute.

Fore wings normal in shape, that is broad, the margins convex; with no transverse oblique (proximo-caudad) hairless line running from the region of the stigmal vein, the discal cilia uniformly close, short and delicate, as are also the marginal cilia (cephalic and apical margins especially, normal position); venation incomplete—marginal, postmarginal and stigmal veins absent, the submarginal vein long and slender, thickening slightly distad, but abruptly terminating before reaching the cephalic margin of the wing; marginal vein represented by a circular fumated spot. Ovipositor acutely saber-shaped, slender, slightly exerted. Axillæ narrow, wedge-shaped, broad, slightly separated.

Head (lateral aspect) wedge-shaped, the base (caudal margin) flat, the opposite (cephalic) margin an inclined plane; from cephalic aspect, triangular. Eyes practically bare. Parapsidal furrows absent.

Resembling somewhat the Aphelinid genera *Casca* Howard and *Bardylis* Howard but distinguished from them by the absence of the marginal and other wing veins, the broader fore wings, the undifferentiated funicle (or the clavate flagellum—excluding pedicel) or antennal characters, by pedal characters and by general aspect and general characteristics.

It is due to Dr. L. O. Howard to state that I was misled by the superficial resemblance of this genus to certain Aphelininæ, so much so as to think of erecting a new genus for it in that group, but thanks to Dr. Howard's

advice, this was not done. I quite agree with previous authors that the assemblage of characters must ally the genus with the Encyrtinae. It is typically encyrtine in appearance. The following are specific characters:

Normal position:—General color shining black, the dorsum of the abdomen black, the disk with some yellow; antennae honey yellow tinged with some dusky; legs and knees concolorous with the antennae, the dorsal aspect of the posterior femur and tibia black; that of the basal half of the intermediate femur dark; most of the anterior femur black; distal tarsal joints dusky, especially at their tips. Maxillary palpi and the tegulae yellow and on the mesothorax just cephalad of the tegula is a small yellow area; venter of thorax black, that of the abdomen dusky yellow, darker in the disk. Across the cephalic margin of the vertex, between the cephalic ends (dorsal aspect) of the eyes from cephalic aspect, between the middle of the eyes along the base of the frons, there is a moderately broad, conspicuous ochreous yellow fascia. Eyes dark garnet; ocelli inconspicuous, dark reddish with some yellow, the lateral ocelli near the caudal margin of the vertex, the three in the usual triangle, the lateral ones far closer to the eye margin than to each other or to the cephalic ocellus.

Vertex and mesothorax, including the axillae, moderately coarsely polygonally reticulated or sculptured, scaly, the sculpture of both somewhat finer than the surface of the eyes and resembling overlapping scales or shingles; the scutellum closely, finely reticulated as if finely, delicately, longitudinally striate. Cheeks, ventrad of eyes, longitudinally rugose, as is also the mesopleura. Eyes round from dorsal aspect. Vertexal carina absent. Scaly sculpture of mesoscutum and longitudinal fine striation of mesoscutellum characteristic.

Fore wings hyaline, but with a circular fumated spot separated from but directly laterad or apicad of the truncated submarginal vein, the latter bearing but from 2-4 large setae, all well separated. Hind wings normal in shape, the discal cilia close as in the fore wing, the marginal cilia absent along the cephalic margin, but moderately long on the caudal margin; the vein short and broad, yellowish, not reaching beyond the proximal fifth of the wing. Scape of antennae reaching to the yellowish fascia across the vertex; club longitudinally striate, its joints connate and also connate with the ring-joints. Abdomen normal, the spiracle of the sixth segment conspicuous, bearing about three long setae and one or two short ones; first and second abdominal segments longer than segments 3-6, but not much more so.

From 18 specimens, $\frac{2}{3}$ -inch objective, Bausch and Lomb

Redescribed from eighteen females reared by Mr. N. Gangule, a student in the Department of Entomology, University of Illinois, October 10-14, 1908, from *Aulacaspis rosae* (Bouché) on the stems of black raspberry, collected by Mr. R. D. Glasgow on October 6, 1908, at Urbana, Ill. The descriptions were made from stupefied specimens, unmounted, later compared with balsam mounts in which many

of the details of color and sculpture were difficult to interpret with certainty. The species has already been recorded from the same host and locality.

Family EULOPHIDÆ.

Subfamily ENTEDONINÆ.

Tribe *Entedonini*.

Genus **MESTOCHARIS** Foerster.

Mestocharis williamsoni, new species.

Female.—Length, 2 mm.

Agreeing with the description of *Mestocharis wilderi* Howard but the metathoracic carina is paired, the lateral carinæ distinct from it and the fovea on the metascutum is absent. Colorationally as in *wilderi* with the exception that the metanotum is metallic greenish. Metanotum not punctate, finely reticulate, the two narrow median carinæ not quite parallel, diverging gradually very slightly caudad and not very close together; parapsidal furrows represented by a conspicuous deep fovea on each side caudad; medially, the base of the mesoscutum longitudinally striate like the scutellum. Occipital margin of vertex acute. Wings with short marginal fringes and moderately dense, normal discal ciliation, hyaline, the marginal vein long, much longer than the submarginal, the stigmal and postmarginal veins both short and subequal; posterior wings ciliate as the fore wing but the marginal cilia along the caudal margin are longer; tarsi 4-jointed; lateral carinæ of the metathorax distinct, the disk of the metathorax elevated above the pleuræ, its margins carinated, forming the lateral carinæ. Abdominal petiole distinct but short, densely punctate; second abdominal segment long, occupying nearly two thirds of the body of the abdomen; the remaining segments all short, longer cephalad, the third transverse, longest of them, the fourth and fifth subequal, shortest; segments of abdomen polygonally reticulated, the large second segment shining, its sculpture faint and confined to its caudal half, the other segments opaque. Ovipositor not exerted. Metathoracic spiracle regularly elliptical, its axis nearly longitudinal, situated just beyond (laterad) the lateral carina; in the lateral aspect of the metathorax a more or less prominent conical projection.

Antennæ inserted about on a line with the ventral ends of the eyes; 8-jointed, the club terminating in an acute spur-like projection which is merely a prolongation of the second or apical club joint and hence not counted as a joint; scape, pedicel, ring-joint, 3 funicle joints and 2-jointed club; funicle joints subpedunculate, broad, tuberculate, the first distinctly longer than wide, the second and third barely longer than wide, all somewhat compressed, the third wider than the second and about a fourth shorter than the first; pedicel normal, moderately long but distinctly smaller than the proximal funicle joint, slightly shorter than joints 2 or 3 and not broad; scape long, cylindrical but one margin convexed somewhat, slightly longer than the

club; the latter conical, ending in a spur, the basal joint large, ovate, nearly as long as funicle joint 3, the apical joint a fifth or sixth smaller. Ring-joint narrow and short. Pubescence whitish hairs of moderate length arranged in whorls and arising from tuberculate white spots. Mandibles 2-dentate, the teeth about equal.

From many specimens, $\frac{2}{3}$ -inch objective, 1-inch optic, Bausch and Lomb.

Male.—Length, 1.95 mm.

The same but more metallic blue especially at the legs and dorsal aspect of the second abdominal segment. Abdomen not stout and conic-ovate but depressed, oval and truncate distad, the genitalia exerted. Antennæ the same but the peduncles of the funicle joints are more conspicuous.

From three specimens, the same magnification. Described from the following series of specimens received from Mr. Warren Williamson, a graduate student in Entomology at the University of Illinois and for whom the species is named. The whole number was reared from Conopid puparia taken from *Bombus americanorum* Fabricius.

(1) Labelled "10—10—20/Exp. 1. Conopid on *Bombus americanorum* Fabricius, Urbana, Ill., Oct. 20, 1910. *Mcstocharis* emerged May 20, 1911. W. W. seven females, one male emerged; twenty-eight females found in a compact mass, interiorly, besides five pupæ and three larvæ (dead). The host puparium had been broken before emergence." (2) Labelled "10—10—9/Exp. 1. Conopid on *B. americanorum*. Same. The host puparium contained dead pupæ only of the parasite; these were in a mass, each pupa upon a single, large, pyriform meconium which resembled chocolate jelly. A second Conopid puparium bearing the same label was also present; on May 27, 1911, 39 females of the parasite emerged, all from a single, round hole in the cephalo-lateral aspect. Inside this host puparium, afterward, was found a wet mass of "viscera" in which was embedded a dead adult female parasite and a larva, besides a number of pupal casts." (3) Labelled "10—10—9/Exp. 1. The same; emerged May 26, 1911. Fifty-one females, three males from two small round holes at the caudo-dorsal and lateral aspects. The host when opened was hollow, containing mere membranous fragments of the host, unrecognizable, and five dead female parasites and a mass of cast pupal skins among which were a few meconial pellets."

Habitat.—Illinois (Urbana).

Types.—Accession No. 45,067, Illinois State Laboratory of Natural History, Urbana, Ill., 1 ♂, 6 ♀♀ on tags. *Homotypcs*.—Accession No. 45,068 of the same laboratory, many specimens in alcohol, 1 vial.

Subfamily APHELININÆ.

Tribe *Aphelinini*.

Genus **PARAPHELINUS** Perkins.

A genus similar to *Aphelinus* Dalman but differing in the following particulars:¹ The antennæ are longer and more slender, both *funicle joints longer than wide*, not wider than long; the fore wings are narrower (about $3\frac{1}{2}$ times longer than wide) and with a conspicuous sooty black band across them, this band deep black not merely embrowned as in *Aphelinus fuscipennis*. The ovipositor is exerted for about a fifth the length of the abdomen. The body is stout and large for the subfamily, the mandibles tridentate, the two outer (lateral) teeth acute and subequal. Otherwise as in *Aphelinus*. Also allied with *Centrodora* Foerster but differing in the black-banded fore wing and more distinct 2-jointed antennal club, as well as in having naked eyes, unequal funicle joints and one joint less in the antenna. From *Perissopterus* Howard it differs in not having the characteristic maculate fore wings and in lacking the "ring-joints" in the antennæ. The genus is based on a species occurring in Hawaii; the following North American form has been captured recently by me and forms the basis for the generic characters just given.

Paraphelinus speciosissimus, new species.

Normal position.

Female.—Length, 1.45 mm., including ovipositor.

General color black, the thorax yellow, excepting the tegulæ, axillæ, pronotum and scutellum, which are dusky black; median line of scutellum yellow; funicle and club of antenna yellow; head suffused with some yellow; all of legs concolorous with yellow of the thorax excepting the caudal coxæ and femora which are black; caudal trochanters pallid; distal tarsal joints not darker. Mandibles fuscous; eyes dark. Both wings hyaline but the fore wing crossed by a conspicuous sooty band beneath the whole length of the marginal and stigmal veins, the band nearly as wide as long, its margin (proximal and distal) not straight, the distal margin irregularly concaved. Venation dusky yellowish. The whole fore wing has a slightly darker shade than the posterior wings.

Scutum and scutellum with a median grooved line, the scutellum polygonally sculptured. Fore wings regularly rounded, the marginal fringes short, very short along the cephalic margin, the discal ciliation uniform, close, fine, the oblique hairless line running through the black band; the subtriangular patch

¹The generic characters following are taken from the species described below.

of discal ciliation proximad of it is about twice coarser than the main body of the ciliation. Marginal and submarginal veins about equal, the postmarginal vein absent, the stigmal distinct but not long. The caudal wing as usual, its discal ciliation sparse, a distinct paired row along the cephalic margin, the blade bluntly pointed. The posterior femora are swollen somewhat. Abdomen ovate. Tarsi 5-jointed. Scutellum not acute along its caudal margin.

Antennæ 6-jointed, inserted near the mouth border—scape, pedicel, two funicle joints and a long 2-jointed club. Scape long and slender, slightly longer than the club, or the combined lengths of the pedicel, funicle and proximal club joint; pedicel moderate, obconic, distinctly longer than either of the funicle joints but shorter than the proximal club joint; funicle joints not large but both longer than wide, oval, the second about a half larger than the first; proximal club joint long, widening distad, a third longer than the pedicel, the distal joint twice the length of the pedicel and conic-oval; club long, cylindrical, tapering to a point distad. Antennæ apparently without pubescence.

Male.—Unknown.

Described from a single female specimen captured May 17, 1911, on the windows of a small granary at Urbana, Ill. (A. A. Girault).

Habitat.—Illinois (Urbana).

Type.—Type No. 14,122, United States National Museum, Washington, D. C., one female in xylol-balsam. This species is large, beautifully and strikingly colored and should be easily recognized.

TUMIDISCAPUS, new genus.

A genus allied to *Paraphelinus* Perkins in general shape of the wings and body, but differing in having the scape of the antennæ enormously enlarged, bearing a leaflike expansion along its entire length and the antennal club is shorter, less slender. Otherwise agreeing structurally with the genus named. *Type*, the following species:

Tumidiscapus flavus, new species.

Male.—Length, 2.50 mm. Large for the subfamily.

General color lemon yellow, the apical half of the abdomen tinged with orange; sides of abdomen darker; appendages concolorous but distal tarsal joint and apical joint of antennal club darker. Wings hyaline, venation yellow. Eyes dark red, ocelli ruby red. Tips of mandibles fuscous.

Fore wings as in *Aphelinus* Dahman but somewhat more slender; marginal vein slightly longer than submarginal, both long, the stigmal vein moderate in length, straight, with a slight neck; postmarginal vein absent. Discal ciliation proximad of the oblique hairless line twice coarser and arranged in about five lines; main discal ciliation fine; marginal cilia short on costal margin, about as long as the proximal discal ciliation, noticeably longer (moderate in length)

disto-caudad, lengthening gradually around the apex from the costal margin. The oblique hairless line runs in front of the apex of the stigmal vein. Posterior wing with about four lines of discal cilia, its longest marginal cilia (caudad) nearly as long as the wing's greatest width. Middle tibial spur long but slender. Mandibles tridentate. Parapsidal furrows complete. Cephalic tarsi with a strigil. Eyes naked, genitalia projecting slightly.

Antennæ 6-jointed; shaft of scape cylindrical but nearly concealed by an enormous ovate leaf-like expansion above and below, which runs its whole length; scape as long as the flagellum; pedicel normal, obconic, longer than either of the following joints; the two funicle joints unequal, the first a third (nearly a half) shorter than the second but distinctly longer than wide, the second twice longer than wide; proximal club joint no longer than funicle one, widening distad, somewhat differentiated from the distal joint which is large, about four times the length of the proximal joint, a third wider and conic-ovate; the distal club joint is longer than the funicle. Pubescence of antennæ sparse. Expansion of scape with a distinct scaly sculpture.

Female.—Unknown.

From a single male specimen mounted in xylol-balsam and captured on the panes of an old shed on a farm at Centralia, Ill., June 21, 1911 (A. A. G.).

Type.—Cat. No. 14,121, United States National Museum, Washington, D. C., one male in xylol-balsam.

Genus **COCCOPHAGUS** Westwood.

Coccophagus lecanii (Fitch).

The following Illinois record: Many specimens from a Lecanium scale on osage orange, Chicago, Ill., August 10–16, 1908 (J. J. Davis).

Genus **PHYSCUS** Howard.

Physcus varicornis Howard.

The following Illinois records: A male and female specimen reared from *Aspidiotus perniciosus* Comstock, Urbana, Ill., July 11 and 4, 1907, respectively (J. A. West). Another female from same host lot, July 4, 1907; eight males, four females reared from *Chionaspis americana* Johnson on elm, Chicago, May 24, 1908 (J. J. Davis); from hibernated *Chionaspis furfura* Fitch on apple, 20 April, 1908, Urbana (one male, two females).

The male has never been described. Its antennæ are filiform, 8-jointed, uniform in color, the club not differentiated, the pedicel very short in comparison with the proximal funicle joint.

Genus **ABLERUS** Howard.**Ablerus clisiocampæ** (Ashmead).

In Illinois this species has been reared as follows: A female specimen from *Aspidiotus perniciosus* Comstock, July 20, 1907, Urbana (J. A. West); from *Chionaspis furfura* Fitch on apple, one female, April 12, 1908, Urbana, Ill. (A. A. G.).

Genus **ASPIDIOTIPHAGUS** Howard.**Aspidiotiphagus citrinus** (Craw.).

I have captured a single female specimen of this species at Urbana, Ill., May 11, 1911, in a greenhouse.

Genus **APHELINUS** Dalman.**Aphelinus mytilaspidis** Le Baron.

I desire to record this common Coccid parasite from the following locality in Illinois: From *Aspidiotus perniciosus* Comstock on plum at Carbondale, Ill., June 20, 1908.

Aphelinus fuscipennis Howard.

This parasite has been reared in Illinois from *Aspidiotus perniciosus* Comstock on plum at Carbondale, June 20, 1908, and from *Aspidiotus uva* Comstock on grape, July 6, 1908, at Anna (L. M. Smith).

Aphelinus mali Haldemann.

The following rearing records: Two females, Urbana, Ill., July 5, 1908, from *Pemphigus fraxinifolii* Riley on ash (J. J. Davis); nine females reared from the same *Pemphigus* at College Station, Texas, June 14, 1907 (C. E. Sanborn).

Family TRICHOGRAMMATIDÆ.

Subfamily OLIGOSITINÆ.

BRACHISTELLA, new genus.

A genus characterized by having the discal ciliation of the fore wing normal, the venation straight, the antennæ 8-jointed (scape, ring-joint, 2 funicle joints and a 3-jointed club), the abdomen conic-ovate, with the ovipositor non-exserted and with the exception of the discal ciliation of the wings resembling *Ittys* Girault (species *cerasarum* Ashmead). It will follow *Brachista* Haliday in my table of genera of the group. The type species is

(Abbella) *Trichogramma acuminatum* (Ashmead), which I have described in full elsewhere (Trans. Amer. Ent. Soc., Phila., XXXVII, 1911, pp. 13, 77-82).

Of *Brachistella acuminata* (Ashmead), very recently I have captured the following specimens: A female at Coulterville, Ill., June 20, 1911, on the window of a wagon repair shop in company with *Aphelinoides semifuscipennis*; three females in the same locality, same time, on the window of a foundry adjoining; a female at Urbana, Ill., May 17, 1911, on the window of a small granary (stored corn); another female, same locality, May 21, 1911, on the pane of a window in a livery stable; nine females at St. Joseph, Ill., May 21, 1911, on the windows of a livery stable; and on May 31, 1911, two females together on a window in a hennery on a farm at Hendrix (Bloomington), Ill. The species appears, then, to be very common in the state of Illinois.

Genus **APHELINOIDEA** Girault.

Aphelinoides semifuscipennis Girault.

On June 10, 1911, several female specimens of this species were captured from the panes of a window in the loft of a livery stable at Nashville, Ill. They serve to confirm the original description of the species and the locality is new. They were running slowly over the pane and resembled to the eye, dark specimens of *Pentarthron minutum* (Riley); also four females, two each on the windows of a wagon repair shop and foundry respectively, at Coulterville, Ill., June 20, 1911; and one June 15, 1911, Marissa, Ill., on a window in a hennery.

Genus **WESTWOODELLA** Ashmead.

Westwoodella sanguinea Girault.

This interesting species has been collected recently in the following localities: One female, Coulterville, Ill., June 20, 1911, on the window of a foundry in company with the *Aphelinoides* and *Brachistella*. A female at St. Joseph, Ill., May 21, 1911, on the window of a livery stable and three females at Hendrix (Bloomington), Ill., May 31, 1911, on the window of a barn on a farm. All the foregoing are the typical red form.

Subfamily TRICHOGRAMMATINÆ.

Genus **UFENS** Girault.**Ufens niger** (Ashmead).

Girault, 1911. Trans. Amer. Ent. Soc., Phila., XXXVII., pp. 32-38, pl. I, fig. 10.

This species very recently has been taken from the panes of a window in a barn on a farm at Hendrix (Bloomington), Ill., May 31, 1911 (one male, three females).

From these specimens I have been enabled to make out the correct structure of the funicle of the antenna which is really 2-jointed; hence the female antennæ are 8-jointed. This applies as well as to *Ufens luna* Girault, a West Australian species.

Also in the original description the male antennæ were erroneously described as being 7-jointed; however, the minute globular apical joint must be counted, which together with the narrow, very short ring-joint makes nine in all—scape, pedicel, a minute ring-joint, a 2-jointed funicle less distinctly differentiated than in the female and a 4-jointed club, less conic and well-defined than in the female.

Family MYMARIDÆ.

Subfamily GONATOCERINÆ.

Tribe *Ooctonini*.Genus **CAMPTOPTERA** Foerster.**Camptoptera clavata** Provancher.

Camptotera clavata Provancher, 1889. Additions et corrections au volume II de la faune entomologique du Canada traitant des Hyménoptères. In Petite faune entomologique du Canada, etc., p. 404.

Camptoptera clavata Provancher, Girault, Annals Ent. Soc. of America, II, 1909, p. 26.

Through correspondence with the Abbé V. A. Huard, Musée de l'Instruction Publique, Quebec, I have been enabled to see the unique type specimen of this species, but unfortunately it met with an accident in the mails and was so badly damaged that only a fore wing and several tarsi remained when it finally reached me. From these fragments, however, I am able to state definitely that it can not be a Mymarid and hence has no place in this genus. The fragments were remounted in balsam. The fore wing is densely ciliate discally and has the venation of a Pteromalid. The marginal fringes of the fore wing are short, the longest not more than a thirteenth of the wing's greatest width. The costal cell is well developed, the submarginal

vein long and slender, eight or more times longer than the short, straight, broad marginal vein, which is twice the length of the stigmal vein, which is distinct but without a neck; postmarginal vein somewhat shorter than the stigmal and short and broad, subconic. Apex of the submarginal vein just before it joins the marginal is colorless. The tarsi are 5-jointed, with the spur forked and the strigil well-developed on the cephalic legs. The proximal tarsal joint is long. The tibiae are curved and enlarged distad, almost club-shaped. The proximal tarsal joint of the cephalic legs is curved at base.

These notes are based on a fore wing and the tibiae and tarsi of two legs mounted in balsam from the original type tag-mount which was labelled "*Camptotera clavata* Prov. 1598." The remounted fragments have been returned to their place of deposit mentioned above.

Subfamily MYMARINÆ.

Tribe *Anaphini*.

Genus **ANAGRUS** Haliday.

Anagrus armatus (Ashmead).

I have the following recent records of this widely distributed species: Two balsam slides bearing a female each, received for identification from Dr. L. O. Howard and each bearing the label "Bred from grape scale. J. F. Zimmer, Washington, D. C., May 27, 1911," also respectively, the numbers "10" and "11." The supposed host is *Aspidiotus uva* Comstock, but it is more probable that the parasites were from some Jassid or similar eggs in the grape stems. And five females collected from windows of stables and barns at St. Joseph, Ill., May 21, 1911.

Genus **ANAPHOIDEA** Girault.

Anaphoidea pullicrura Girault.

I have an additional female of this species captured in a greenhouse, Urbana, Ill., May 5, 1911.

Genus **ANAPHES** Haliday.

Anaphes sinipennis Girault.

Since describing this species I have captured another female of it at Urbana, Ill., May 20, 1911, on a window.

Anaphes nigrellus Girault.

Mr. Warren Williamson, a graduate student in the Department of Entomology of the University of Illinois, was kind enough to give me a male specimen of this species which alighted on his cuff while he was working in the laboratory at Urbana, May 20, 1911. It was colored like the female. Also an additional female at Litchfield, Ill., July 13, 1910 (A. A. G.), from the window of a livery stable.

Anaphes iole Girault.

A male of this species I captured by sweeping at Butler, Ill., July 14, 1910. It is like the female; the antennæ are filiform, 12-jointed, the funicle joints gradually lengthening to the club which is shorter and subequal to the proximal funicle joint.

Anaphes pratensis Foerster.

I have what is undoubtedly a female of this European species which was captured from a cuff while sitting in blue grass, Urbana, Ill., May 7, 1911. The long slender proximal funicle joints are characteristic.

Tribe *Mymarini*.Genus **MYMAR** Haliday.**Mymar venustum Girault.**

In the current (June, 1911) volume of the Journal of the New York Entomological Society, I proposed in a footnote the name above mentioned for a specimen of this genus which was supposed at first to be *Mymar pulchellum* Curtis. The specimen had been found in the collections of the United States National Museum and in the place referred to I called attention to the occurrence of the genus in North America; at the same time the specimen was described in detail for the reason that I was not certain it was *pulchellum*. Subsequently, through the kindness of Mr. C. O. Waterhouse, I received a pair of the latter species and am now able to point out the differences between the English and American species.

In general appearance they are very similar, especially in coloration. The following structural differences are present: In the fore wing there are about four more primary marginal cilia (34); in *pulchellum* only from 28 to 30; the primary marginal cilia are somewhat coarser and the wing blade somewhat larger than in *pulchellum*; the nearly central line of discal cilia in *pulchellum* extends proximad

to the apex of the blade, whereas in *venustum* it ends against the costal margin of the blade, some distance (about 3 cilia) distad of the apex of the blade; in *pulchellum* the fumated portion of the blade is smoky black, in *venustum* smoky brown. In the color of the antennæ: In *venustum*, they are yellow (light gamboge) with the exception of the club which is fuscous or black brown; whereas in *pulchellum*, the first three funicle joints and the club of the antennæ are black brown, the other joints yellow. The male of *pulchellum* is like the female; its antennæ, however, are filiform and 13-jointed.

From a male and female of *pulchellum* labelled "Richmond, Eng. 10. 9. 10. C. Waterhouse," remounted in xylol-balsam from a card and the single type specimen of *venustum*.

Type (of *venustum*): Cat. No. 13,820, U. S. National Museum, Washington, D. C., 1 female in xylol-balsam.

Genus **POLYNEMA** Haliday.

Polynema consobrinus Girault.

Of this very common member of the genus the following recent captures have been made in Illinois: One female from the window of a livery stable, St. Joseph, May 21, 1911. One female on the window of a hennery on a farm at Hendrix (Bloomington), May 31, 1911; another female on a stable window at Ridgefarm, May 29, 1911; two others in a greenhouse, Urbana, May 5 and 6, 1911, and one May 9, 1911, in the same place on the panes of a window in a livery stable.

Polynema longipes (Ashmead).

I have captured a single female specimen of this species at St. Joseph, Ill., May 21, 1911, on the window of a stable. Also three others at Nashville, Ill., June 10, 1911, in a similar situation.

Polynema graculus Girault.

At St. Joseph, Ill., May 21, 1911, I took a male of this characteristic species from the pane of a window in a livery stable.

THREE NEW GALL MIDGES (DIPT.).

By E. P. FELT,

ALBANY, N. Y.

The three species of Itonidae described below were reared from a section of a dead, partly decayed wild fig branch collected at Paraiso, Panama, by Mr. E. A. Schwarz, in connection with the biological survey of the isthmus under the auspices of the Smithsonian Institution. Many of the specimens were reared by Mr. H. S. Barber at Washington, while a few issued from material sent the writer. The types will be deposited in the National Museum.

Holoneurus occidentalis, new species.

Larva.—Length 3 mm., slender, reddish orange, with distinct and widely separated pseudopods. Head moderately large and with long antennae, the latter with a length four times the diameter. The dorsal part of the head appears to be chitinized and attached thereto are submedian, strongly curved, stout, hooked, chitinous processes. The head is ornamented with a number of long, slender setae. Skin coarsely shagreened: breastbone distinct, expanded anteriorly, bidentate posteriorly, tapering to a rudimentary extremity; each segment with a transverse series of six long setae dorsally near the posterior margin, and laterally with one or two setae near the anterior third; the posterior extremity broadly rounded and on each side three submedian tubercles, each bearing a long seta.

Male.—Length 1 mm. Antennae a little longer than the body, sparsely haired, yellowish brown; 16 segments, the fifth having a stem one-fourth longer than the cylindric basal enlargement, which latter has a length over twice its diameter, a sparse basal whorl of short setae and a rather thick sub-apical whorl of much longer, stout setae; terminal segment reduced. Palpi; first segment quadrate, with a length over twice its diameter, the second stouter, one-half longer than the first, the third one-half longer than the second, more slender, the fourth a little longer and more slender than the third. Mesonotum fuscous yellowish. Scutellum yellowish red, postscutellum yellowish. Abdomen mostly fuscous yellowish. Wings hyaline, costa pale straw, the third vein uniting therewith at the apex of the wing, the fifth simple. Halteres yellowish transparent. Coxae and legs pale straw, the distal tarsal segments somewhat darker. Genitalia: basal clasp segment short, stout, truncate; terminal clasp segment short, stout, broadly rounded and spinose apically; dorsal plate rather long, deeply and roundly emarginate, the lobes obliquely rounded distally; ventral plate bilobed. Harpes linear, chitinous; style short, stout, narrowly rounded apically.

Female.—Length 1.5 mm. Antennae extending to the second abdominal segment, sparsely haired, fuscous yellowish, the basal segments yellowish; 16 segments, the fifth having a stem about one-third the length of the subcylindric basal enlargement, which latter has a length about twice its diameter, a rather thick subbasal whorl of long, stout setae and a scattering, subapical band of slender setae; terminal segment with a length about three times its diameter, narrowly separated from the preceding and tapering to a subacute apex. Claws long, slender, evenly curved, unidentate, the pulvilli rudimentary. Ovipositor when extended about one-third the length of the abdomen, the terminal lobes slender, indistinctly triarticulate, the distal segment with a length about three times the diameter and sparsely setose.

Type Cecid a2177b, N. Y. State Museum.

Several specimens of this midge were reared the latter part of May, 1911. It is allied to *H. clongatus* Felt, from which it is separated by the shorter stems of the antennal segments.

***Lasipteryx schwarzi*, new species.**

Male.—Length 1 mm. Antennae nearly as long as the body, thickly haired, dark brown; 12 segments, the fifth with a stem about three-fourths the length of the cylindric basal enlargement, which latter has a length one-half greater than its diameter, a sparse subbasal whorl of rather short setae and a thick subapical band of long, slender setae; terminal segment somewhat produced, fusiform, with a length about three times its diameter. Palpi; first segment irregularly subquadrate, the second with a length nearly three times its diameter, the third a little longer, more slender, the fourth nearly one-half longer than the third, slender. Mesonotum shining dark brown. Scutellum reddish brown, sparsely haired, postscutellum darker. Abdomen mostly dark brown, the distal segments and genitalia more or less yellowish orange. Wings subhyaline, the membrane rather thickly scaled, costa dark brown or black; the third vein unites with costa near the distal ninth; the fifth joins the posterior margin at the distal fifth, its branch near the basal third. Halteres yellowish orange. Coxae, femora and tibiae mostly yellowish orange, the tarsi dark brown. Claws rather long, slender, evenly curved, unidentate, the pulvilli about one-half the length of the claws. Genitalia; basal clasp segment rather long, moderately stout, truncate; terminal clasp segment somewhat swollen basally, strongly curved apically; dorsal plate long, deeply and triangularly incised, the lobes tapering to a narrowly rounded, sparsely setose apex; ventral plate long, broad, broadly and roundly emarginate, the lobes sparsely setose. Harpes rather long, slender, with a long, stout, chitinous process apically; style rather long, broad, truncate distally.

Female.—Length 1.4 mm. Antennae extending to the base of the abdomen, sparsely haired, fuscous yellowish; 12 subsessile segments, the fifth subcylindric, with a length about twice its diameter, tapering slightly distally, with a sparse subbasal whorl of moderately stout setae and a scattering subapical band of longer, more slender setae; terminal segment reduced, sub-

fusiform, with a length about $2\frac{1}{2}$ times its diameter. Mesonotum shining dark brown. Scutellum reddish brown, postscutellum fuscous yellowish. Abdomen dark reddish brown, the ovipositor yellowish, longer than the abdomen; terminal lobes with a length about $2\frac{1}{2}$ times the width and tapering slightly to a broadly rounded, sparsely setose apex; minor lobes short, obtuse. Other characters practically as in the male.

Type Cecid a2177, N. Y. State Museum.

Numerous midges were reared in the spring of 1911. This species is easily separated from the allied *L. flavotibialis* Felt by the larger number of antennal segments and marked differences in coloration.

Hyperdiplosis americana, new species.

Larva.—Length 1 mm., a variable yellowish orange, moderately stout. Head rather slender, the antennæ stout, with a length about three times the diameter; breastbone short, indistinctly trilobed; ocular spot indistinct; skin coarsely shagreened, the body segments each with a moderately stout seta laterally, posterior extremity bilobed, the apex of each lobe slightly chitinated.

Male.—Length 1 mm. Antennæ one-half longer than the body, thickly haired, light brown; 14 segments, the fifth having the two portions of the stem, each with a length fully thrice the diameter, the basal enlargement subglobose, with a thick subbasal whorl of long, stout setæ and a slender subapical circumfilum, the loops of the latter extending to the base of the slightly produced distal enlargement, which latter has a length one-half greater than its diameter, a thick whorl of long, stout setæ and subbasal and subapical circumfili, the loops of the subapical filum extending to the base of the following segment; terminal segment produced, basal portion of the stem with a length five times its diameter, the distal enlargement cylindric, with a length three times its diameter and apically a long, fingerlike process. Palpi; first segment subquadrate, the second twice the length of the first, slender, the third as long as the second, more slender, the fourth about as long as the second. Body pale yellowish. Wings yellowish, the third vein uniting with costa well beyond the apex of the wing. Halteres pale yellowish. Coxæ and base of femora whitish transparent, the distal portion of femora, tibiæ and tarsi pale yellowish. Claws stout, strongly curved, simple, the pulvilli about two-thirds the length of the claws. Genitalia; basal clasp segment rather slender, truncate; terminal clasp segment long, slender; dorsal plate short, deeply and narrowly incised, the lobes broadly emarginate, produced laterally, the angles each with a stout seta; ventral plate long, very deeply and roundly emarginate, the lobes slender, parallel and with a length fully five times the width; style long, slender, narrowly rounded.

Female.—Length 1.2 mm. Antennæ one-fourth longer than the body, sparsely haired, light brown, the stems whitish, the fifth with a stem a little longer than the subcylindric basal enlargement, which latter has a length about $2\frac{1}{2}$ times its diameter and subbasal and subapical whorls of rather long, stout setæ; terminal segment produced, the basal enlargement subcylindric,

with a length five times its diameter and apically with a rather stout, fusiform appendage. Ovipositor short, the terminal lobes narrowly ovate and sparsely setose apically. Other characters practically as in the male.

Type Cecid a2177a, N. Y. State Museum.

This small, pale midge was reared in some numbers from May 31 till early in June, 1911. This species is allied to the somewhat aberrant *H. cupatorii* Felt and cannot be considered typical of the genus. It is easily recognized by the very greatly produced, slender lobes of the ventral plate.

A NEW SPECIES OF LUPERODES.

BY CHARLES W. LENG,

WEST NEW BRIGHTON, N. Y.

Among the beetles collected in the mountains of Georgia in July, 1910, by Mr. William T. Davis, are three specimens belonging to the genus *Luperodes* which resemble in most respects *L. thoracicus* Mels., but differ in being smaller and in color superficially, and in the proportion of the joints of the antennæ and tarsi structurally. There is also a marked difference in the width of the thorax. For the new species represented by these specimens I propose the name *Luperodes davisi* in recognition of the many discoveries in Natural History made by my life-long friend. The complete description is as follows:

Luperodes davisi, new species.

Form oval, slightly oblong, dark piceous, head, thorax, femora, first three joints entirely and base of outer joints of antennæ rufotestaceous. Antennæ with the third joint one and a half times as long as second joint, the two together longer than the fourth. Head smooth, the transverse impression straight, not reaching the eyes, the carina between the antennæ sharply defined. Thorax a little wider than long, not narrowed in front, sides strongly arcuate, hind angles not prominent, rounded, disc moderately convex, sparsely obsoletely punctulate, margin slightly reflexed. Elytra nearly twice as long as wide, sides feebly arcuate, surface smooth, sparsely obsoletely punctate. Body beneath, except pro- and mesothorax, black. Legs black, femora and under side of tibiæ fuscous. Length 3.5 mm. = .14 inch. Female has last ventral oval at tip; male unknown.

The type is in the collection of Mr. Davis and was found near Clayton, Rabun Co., Georgia, elevation, 2,000 ft. Two specimens

which I associate with the type were also found by Mr. Davis at Cornelia, Ga., at an elevation of about 1,500 ft. All three were taken in July, 1910.

The greatest difference between this species and *thoracicus* is in the posterior tarsi which in the latter have the first joint as long as half the tibia and much longer than all the remaining joints together, while in *thoracicus* the first joint is as long as one-third the tibia and equal to all the following joints together. The most obvious differences are in the pale head and partly pale antennæ and the much smaller body.

THE EFFECTS OF PARASITIC CASTRATION IN MEMBRACIDÆ.

BY IGNAZ MATAUSCH,

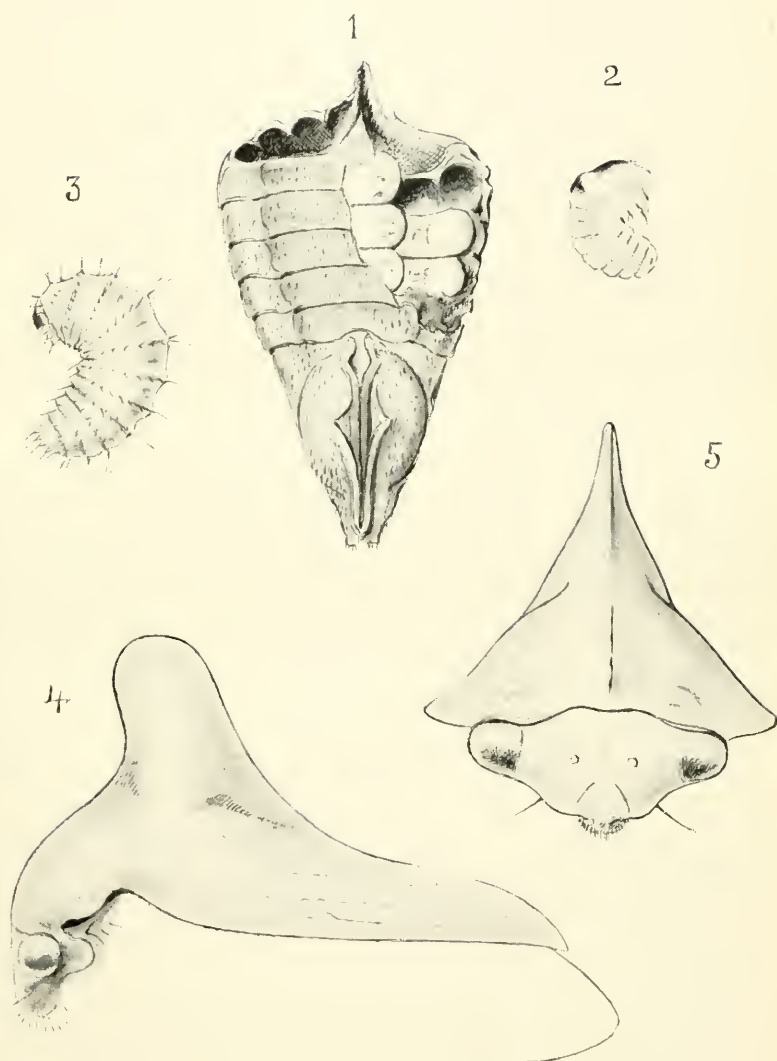
ROSELLE, N. J.

(WITH PLATE VI.)

In an article published in the December number, 1909, of this periodical I described as "gynandromorphs" some anomalous forms of a small species of *Telamona* found on the sweet gum (*Liquidambar styraciflua*). Professor W. M. Wheeler suggested at the time (*in litteris*) that these anomalies might be due to the presence of parasites and therefore represent conditions similar to those found by Giard in *Typhlocyba*.¹

Having had little experience in microscopic dissection, I asked Dr. A. Petrunkevitch to examine some of the specimens. He very courteously complied with my request, and in one of them found 19 small larvæ. Another specimen which he returned to me with only the ventral abdominal wall removed and showing the larvæ in position, is represented in Pl. VI, Fig. 1. It shows five parasites very clearly and a sixth partly concealed. One of these was removed and is shown in Fig. 2. The larvæ lie on the abdomen, with their own abdomens directed towards the dorsal and their thorax and ventral surface towards the ventral side of their host. Unfortunately I

¹ Sur la castration parasitaire de *Typhlocyba* par une larve d'Hyménoptère (*Aphelopus malaleucus* Dalm.) et par une larve de Diptère (*Ateloneura spuria* Meig.), C. R. Acad. Sci., CIX, 1889, p. 708.



Parasitized Membracids.

did not succeed in rearing any of the parasites. The larvæ, however, escaped from one of the only three infested specimens of the small species of *Telamona* taken during the summer of 1910.

July 1, 1910, I found, in the locality in which I collected during 1909, the first of these sexual anomalies, but this belonged to the large *Telamona* species (near *heliria*). It was feeding on *Liquidambar*. July 2, on the same food-plant and in the same place, I took two more of the anomalies and three normal females of the small *Telamona*, which had been much more abundant during the preceding year. July 5 I captured one anomalous specimen and a normal male. Acting on the advice of Dr. Petrunkevitch I kept the anomalies alive on their food-plant in order to give the parasites an opportunity to pupate, but the Membracids all died before the parasitic larvæ could effect their escape from them.

The *Telamona* taken July 5 was kept in a glass by itself, but on the fourth day, when I was about to give it fresh food, I found it dead. In the glass were five pale green larvæ which moved about like Dipterous maggots. These had made their escape through the ventral integument of the Membracid. Two of them, which seemed to be vigorous enough to live, I placed on some earth and preserved the three others in alcohol. Fig. 3 represents one of the latter. I was hindered at this time from continuing my observations. Three weeks later when I looked for the larvæ left on the earth, I found that they had disappeared and all the earth was covered with mould.

I have also found *Carynota mera* infested with parasitic larvæ very similar to those of *Telamona*. One specimen of the former Membracid was taken in the beginning of July, the other on the twenty-eighth of the same month. The abdomen of the latter specimen was abnormally distended with the parasites. In neither case did I succeed in rearing these to maturity. The same was true of *Thelia bimaculata* which I found in considerable numbers during 1909 near Newark, N. J. Among these were ten individuals with abnormal genitalia of the type described in my former paper and all contained parasitic larvæ.

This association of parasites with a malformation or inhibition of the development of the external genitalia occurs, however, not only in *Telamona*, *Carynota* and *Thelia* but also in *Glossonotus*, for I have found three parasitized specimens belonging to this genus

among a series kindly given me by Dr. John B. Smith. Another specimen with abnormal genitalia, which was received from Mr. G. Franck of Brooklyn, is represented in outline in Figs. 4 and 5. It is as large as a large female of *Glossonotus univittatus*, but with the prominence behind the humeri and the tip of the prothorax more arcuate, and with the humeral projections of *G. acuminatus* and the wings of *G. univittatus*.

That the parasites produce the sexual anomaly also in *Cyrtolobus* is proved by a specimen which I collected together with several normal individuals, July 13, at Woods Hole, Mass. This has the external genitalia of a female, but they are only half the normal size. Careful examination revealed the presence on the abdomen of small white lumps which were undoubtedly parasitic larvæ that had died in the act of leaving the body cavity of their host.

It is worthy of note that none of the parasitized Membracids lives well in confinement, except the small *Telamona* which are very active, one might almost say playful. It is certainly remarkable that the parasites often die without leaving the Membracids and apparently before attaining their full size, notwithstanding the fact that they destroy the internal sexual organs of their hosts. In many cases the abdomens of the latter are far from reaching their normal dimensions, while in others they swell up to an extraordinary size. Some of the latter insects, when dried, look as if they were hollow.

MISCELLANEOUS NOTES.¹

***Utetheisa bella* var. *nova*.**—A rather peculiar error occurs in Smith's last edition of the Insects of New Jersey which it seems advisable to point out without delay. On page 438 under *Utetheisa bella* are listed three varieties, the last of which is *nova* and is credited to N. and D. (Neumægen and Dyar). In the preparation of his notes for the list the present writer included in his records the typical

¹ The New York Entomological Society has decided to publish in each issue of its JOURNAL a number of short notes. Members of the society and other contributors are requested to send any observations that may be properly included in this department of the periodical to the Secretary, Mr. H. G. Barber, Roselle Park, N. J.

form of *bella* from Paterson, N. J., the variety *hybrida*, and an entirely new variety which, following the plan of the previous list, he listed simply as "var. nov." with the locality in which it was taken. In order to insure its merited insertion into the list as a new variety without name he characterized the three varieties for Professor Smith's benefit little thinking the author would deviate from the general plan of the work and include these diagnoses in it. Somehow or other the "*var. nov.*" slipped in as *var. noza*, with Neumægen's and Dyar's initials following it and, the characterization being added, the name must stand. But who is the author of the variety? There is no rule of zoölogical nomenclature governing the case but Dr. Stiles, to whom I applied for information kindly tells me that the author of a species as given in a publication is assumed to be correct until proved to be incorrect. The correction is here made, therefore, and the variety credited to Professor Smith.

The remarkable variety to which the name in question applies deserves a more extended notice than that given in the New Jersey lists. It differs from the normal form in that the pink is entirely replaced by bright yellow, and this is especially striking on the under side where in normal specimens the pink covers the whole surface except for the black markings, the edge of the costa, and the fringes. Above, the differences do not appear to be so great, the yellow of the primaries being paler than is usually the case, and the secondaries appearing more white or cream rather than bright yellow, thus from this side approaching in appearances the variety *terminalis*.

Three specimens of this form were taken on August 7, 1903, on the outskirts of Paterson, N. J. Thousands of the normal moths were present at the time in a small area not over fifty feet broad by one hundred in length. Two hundred specimens were taken in about two hours among which were two of the variety *hybrida*. *Noza* in each case was detected as being different from the others while still on the wing and the first specimen taken was thought to be faded: as a matter of fact all three are absolutely fresh.

The sandy area where these occurred was well covered with the bare stalks of the common rattlebox (*Crotalaria sagittalis*) on which an occasional larva of *bella* was still clinging. Hundreds of others in all stages of growth were crawling out of the open end of the pit (for the place had in years past been used as a "sand diggings,"

and three sides were hemmed in by steep embankments, up the loose sand of which the larvæ could not ascend) and they continued in a straight line until the first track of a railway a dozen or fifteen feet away was reached. They then travelled either east or west along the rail, and it was these numerous larvæ crawling over one another along the base of the rail that first attracted my attention to their breeding ground. The explanation of the larvæ travelling was obvious. They had completely defoliated every plant on the breeding territory and were now migrating to "fresh fields and pastures new." Undoubtedly the larger proportion of them died as nowhere in the immediate vicinity do I know of other patches of *Crotalaria*, nor of the presence of any other of their recorded food plants. Some larvæ, however, were sufficiently grown to pupate as was evidenced by the fact that over sixty cocoons were collected from beneath the angle of the Frail, most of which had the still unchanged larva within them.

JOHN A. GROSSBECK.

Two Hemiptera New to New Jersey.—The following two, locally rather rare, Hemiptera have recently been taken in New Jersey and are not recorded in Smith's new "List of the Insects of New Jersey": *Acantholoma denticulata* Stål, collected by Dr. F. E. Lutz near Hackettstown, N. J. in the Schoolie Mts., May 20th, and *Banasa sordida* Uhl., taken by Mr. W. T. Davis in Cape May Co., N. J., August.—H. G. BARBER.

Vanessa milberti in New York City and Vicinity in 1910.—We have no previous record of *Vanessa milberti* being as common in and about the city of New York as it was during the fall of 1910. Mr. Wm. P. Comstock reports one in a back yard at Newark, N. J., on October 13, and another near the Grant Avenue crossing of the Erie railroad at Hanison, N. J., on October 24. One was observed on Staten Island by Mr. Oscar Fulda on September 23; one was captured October 10 by Mr. Jacob Doll while it was flying about the grounds of the Brooklyn Museum near Prospect Park, and on October 18 one was seen at Sea Cliff, Long Island, by Mr. Geo. P. Engelhardt. A still more southern record was the capture by the writer on October 19 of a *milberti* near Keyport, N. J., just north of Matewan Creek.—WM. T. DAVIS.

***Pamphila phylæus* Drury.**—A demonstration of the manner in which some animals elude observation was given on October 5, 1910, by Mr. Abbott Thayer in Dr. Southwick's pleasing little garden in Central Park, N. Y. City. While the birds and dried butterflies were being placed among the foliage and the flowers, many living insects were also observed, and among them *Pamphila phylæus*. It at first eluded capture, and was gone for nearly two hours, but later returned to the same clump of flowers. The southern species was taken at Lake Hopatcong, N. J., on August 29, 1908, but it is quite uncommon about New York City.—WM. T. DAVIS.

Arrival of *Danais plexippus* in the Spring.—In the last edition of "The Insects of New Jersey" it is stated that only the females of *Danais plexippus* return to their place of birth in the spring following the fall southward migration of the species. From observations made on Staten Island and in the vicinity of New York City it appears that the females are the first to arrive in the spring. Individuals have been seen as early as April 25 at Lakehurst, N. J., and in the latter part of April at Jamesburg. Males, however, are also to be found in the spring migration. One was collected on the southern end of Staten Island on May 17, 1908. As no hibernating individuals have been found so far north, the male no doubt flew north with the other migrants.—WM. T. DAVIS.

***Cicindela purpurea limbalis* in the Vicinity of New York City.**—In the Bulletin of the Brooklyn Entomological Society for August, 1878, Mr. F. G. Schaupp records the taking of a single specimen of *Cicindela limbalis* Klug, by Mr. H. Koestlin near Fort Lee, N. J. in the month of May. In the local collection of the American Museum there is a *limbalis* collected by Mr. H. S. Harbeck at South Orange, N. J., Sept. 1, 1888, and another in my collection was collected at Ramapo, N. Y., on April 11. Mr. Chas. E. Sleight found a *limbalis* at Bear Swamp, Ramapo Mts., September 6, 1909, and Major Wirt Robinson has collected it near West Point. On the opposite side of the Hudson, and nearer New York City, is the locality at Peekskill where Mr. John D. Sherman, Jr., collected a number, several of which are now in the collection of Mr. Edward D. Harris. Recently Mr. Frank E. Watson gave me a large individual found by him on the Ramapo Mts. near Southfields, N. Y., October 12, 1910, at an

elevation of about one thousand feet. In addition to the above there is the Boonton locality mentioned in the third edition of the "List of New Jersey Insects."—WM. T. DAVIS.

***Anthrenus fasciatus* in Georgia.**—Several months ago the American Museum received from F. J. Manborgue, an upholsterer in Augusta, Ga., a number of specimens of *Anthrenus*. Dr. Walter Horn kindly identified them as *Anthrenus fasciatus* Hbst. (= *isabellinus* Küster). This species is known from Algeria, Spain, Greece, southern Russia, Mesopotamia and East Indies. Mr. Manborgue writes that they were found in the curled hair of furniture built twelve or fifteen years ago and that the hair is believed to have been imported from Russia.—DR. FRANK E. LUTZ.

***Phymatodes lengi* Joutel.**—This name appears in Prof. Smith's recent list of New Jersey insects, but no description has as yet been published. Pending a fuller account of the species, it may be stated that *lengi* has the ventral surface of the abdomen black instead of red as in *amannus* Say, which it closely resembles. It is also a narrower and longer insect.—L. H. JOUTEL.

***Miastor* Larvæ.**—These remarkably interesting larvæ reproduce by pædogenesis, are available for laboratory work to a marked degree and must be widely distributed as well as allied forms. Very little is known concerning American species, largely because their habitat is one rarely explored by entomologists. They breed mostly in decaying vegetable matter. We have been very successful in finding them under partially decayed chestnut bark of stumps, fence rails and sleepers which have been cut one or two years earlier. European species occur under the bark of a variety of trees and even in sugar beet residue. These Dipterous maggots with diverging antennæ and a fuscous ocular spot in the first body segment, have a flattened, triangular head quite different from the strongly convex, usually fuscous head of the *Sciara* larvæ occurring in a similar environment. They have a length of from 1/20 to 1/8 of an inch and may be found in colonies containing a few large, white larvæ with numerous smaller, yellowish individuals, the latter being more common at the present time. Early spring with its abundance of

moist bark appears to be the most favorable season for finding the larvæ. The writer would welcome the coöperation of entomologists and others in searching for these forms in different parts of the country. He will be pleased to determine specimens found under various conditions, make rearings therefrom if possible, and thus add to our knowledge of the subfamily Heteropezinæ, a group which should be fairly abundant in North America and one deserving careful study.—E. P. FELT.

Miastor Larvæ in Connecticut.—In connection with the preceding note by Dr. Felt it may be of interest to record that Mr. C. T. Brues and I found large numbers of *Miastor* larvæ at Colebrook, Litchfield County, Conn., June 8, 1911. These larvæ, many of which were in active pædogenesis, were living in colonies under the bark of elm and maple stumps in a damp but open wood. The trees had been recently felled and there was considerable sap between the bark and wood. In the same locality I failed to find any of these larvæ during the last week of July and first week of September.—W. M. WHEELER.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF TUESDAY, MAY 3, 1910.

Held at the American Museum of Natural History. President C. W. Leng in the chair with sixteen members present.

Reports were received from the Treasurer and the Curator.

Mr. Dow of the Field Committee reported that the Decoration Day and Fourth of July meetings were very nearly arranged for and would be reported upon at the next meeting.

Mr. Joutel exhibited living larvæ of *Thelydrias contractus* and stated that he had on a former occasion made four applications of bisulphide of carbon in order to kill one of them and had been unsuccessful. He demonstrated that by a liberal application of bisulphide of carbon none of the four larvæ was harmed. He remarked that the life cycle was apparently one year, but that they had, without food, lived for three or four years in the larval stage.

Mr. Schaeffer exhibited a number of new Carabidæ which he has been studying lately, the descriptions and notes of which will be published in the Bulletin of the Brooklyn Museum. He gave the distinguishing characters of most of the species and pointed out also some synonymy in the group. Among

he new species were several *Petrostichus*, *Lebia*, *Harpalus*, etc., and a new species of the strictly tropical genus *Inna* from Brownsville, Texas.

Professor H. E. Crampton referred to some of his former experiments in grafting of various Lepidoptera as unsuccessful since the adults of these grafts failed to mate. He spoke concerning the results of some work he had been carrying on for a number of years which dealt statistically with certain biological problems such as variation. Long series of measurements and observations had been made in the larval and pupal stages of some of the more common Bombycine moths to determine what bearing the relative length of certain structural parts and weight of the whole had to do with the character of the adult. Although the work was not yet completed he had determined that there was undoubted correlation in this respect, as shown by various statistical tables.

Dr. E. P. Felt spoke concerning "Some Interesting Observations on Cecidomyid Genera." Among other things he referred to the help he had obtained in visiting and studying various European collections of gall midges. He spoke of the new list of gall midges which he had prepared and mentioned the number of synonyms as somewhat diminished by his recent studies. In this list 129 genera were represented and the life histories of a large number had been successfully worked out.

Mr. Henry Bird in speaking of "New York City's Fifty Mile Faunal Zone as Relating to the Noctuid Genus *Papaipema*" exhibited a collection of most of the species to be found in the eastern part of the United States,—22 of which positively occur within the 50-mile zone, with 4 others likely to occur there. He spoke of the distinguishing characters of the genus which had been separated from the *Hydracia* by Professor J. B. Smith. He referred also to the habits of a number of the species. They are for the most part borers in the stems and roots of perennial plants. The larvæ are characteristically striped and difficult to breed as a whole because of the wide range of food plants necessary for rearing.

Mr. Davis exhibited several strainers which had proved very satisfactory for sifting.

The society adjourned.

MEETING OF TUESDAY, MAY 17, 1910.

Held at the American Museum of Natural History at 8.15 P.M. with President C. W. Leng in the chair and sixteen members present.

The Librarian, Mr. Schaeffer, read a list of exchanges recently received, as follows:

Verhandlungen d. k. k. zool. bot. Gesellsch. in Wien, LIX, No. 9.

Societas Entomologica, XXIV, Nos. 23, 24; XXV, No. 1.

Zeitschrift f. wiss. Insektenbiologie, VI, No. 3.

Entomologische Zeitschrift, XXIV, Nos. 1-4.

Canadian Entomologist, XLII, Nos. 4, 5.

Coleopterorum Catalogus, Parts 11-14.

Deutsche Entomol. Zeitschrift, 1910, No. 2.

Anales del Museo Nacional de Buenos Aires, Ser. 3, Vol. XII.

Bull. Buffalo Soc. Nat. Sci., IX, No. 3.

Catalogue of Nearctic Spiders by Nathan Banks.

New Hymenoptera from the Philippine Islands by J. C. Crawford.

Three New Genera and Species of Parasitic Hymenoptera by J. C. Crawford.

Stettiner Entomol. Zeitung, LXXI, No. 2.

Bull. de la Société Entomol. d'Égypte, 1909, No. 4.

Wiener Entomol. Zeitung, XXIX, No. 4.

The curator, Dr. Lutz, exhibited the cases holding 144 Schmitt boxes, prepared for the reception of the Hymenoptera and Diptera belonging to the local collection.

Mr. Olsen, of the field committee, reported on the arrangements for the Decoration Day excursion to Newfoundland, N. J.

On motion of Dr. Love it was voted to dispense with the meetings of the society during June.

Dr. Lutz on speaking concerning the results of the American Museum of Natural History Expedition to add material to the local collection, outlined the route thus far followed and compared the different localities visited. He discussed the characteristics of the faunal regions of New Jersey and gave it as his opinion that local conditions, soil, moisture, etc., would determine distribution within the state rather than topographical conditions.

Mr. Leng mentioned the using of a light to attract beetles along the muddy banks of the Passaic River. By this means he captured seventeen species, mostly of the genera *Platynus* and *Bembidium*.

Mr. Bischoff exhibited two parasites of the cockroach. He also mentioned examining ant hills near Newark, N. J., and the capture of some good beetles by tearing these to pieces.

Mr. Davis exhibited a specimen of *Largus succinctus* taken at Baldwin, Long Island, which appears to be a good record for so northern a locality. Mr. Davis also showed specimens of *Cicindela generosa* taken at Old Bridge, N. J., which showed some variation in their markings; also a series of *Brumus davisi* from Wyandach, L. I., Lakehurst, N. J., and Japank, L. I., showing considerable variation from the normal.

Mr. Leng stated that Casey was of the opinion that the species he had called *Brumus septentrionalis* var. *davisi* was new and should be called *Brumus davisi* Leng.

Mr. Southwick spoke of a new insect, a caterpillar, the moth of which he had not seen, affecting rhododendrons.

Mr. Engelhardt stated that from the character of the work it was probably a moth of the genus *Sesia* which had been destructive in a similar way in Prospect Park, Brooklyn.

Mr. Southwick mentioned that he had obtained a photograph of Dr. Zabriskie for the society.

Mr. Joutel exhibited a specimen of *Cylene robinia* captured about the

middle of May in the city. This is unusual as this species hatches in the late summer and autumn.

Mr. Schaeffer exhibited some Coleoptera which had been taken in Chokolosee, Fla., and obtained through Mr. Franck. Most of these had been introduced from Cuba. He also showed four good species of Coleoptera taken at Wyandach, L. I.

Mr. Leng stated that at a meeting of the Deutsche Ent. Gesellschaft, March 14, Schenkling gave some statistics as to the number of described Coleoptera. Linné in 1758 knew 574 species, in 1788, 4,000 species. Dejean possessed in 1830, 21,000 species, Gemminger and Harold listed 77,026 species. From the first ten installments of the new catalogue Schenkling figured that as 7,078 species therein named take the place of 2,718 listed by Gemminger and Harold, the total in completion of the new catalogue, may be 250,000. Gebien commenting on his statement said that in Tenebrionidae the 4,200 species listed by Gemminger would grow to 146,000 species and he believed that only one-fourth of the species existing in nature would be covered even then. Ohaus stated that in the Rutelidae the G. and H. numbers would be multiplied six or seven times.

The society adjourned.

MEETING OF TUESDAY, OCTOBER 4, 1910.

Held at the American Museum of Natural History Tuesday at 8.15 P.M. Dr. E. B. Southwick was elected to preside as chairman in the absence of the president and vice-president. Twenty-two members were present.

Minutes of the meeting of May 17 were read and approved. The Treasurer, Mr. Davis, made a report in which he stated that he had found it necessary to transfer \$100 from the society's account to help out the JOURNAL account. He recommended that space be given in the JOURNAL for short notes, with the expectation that it might add to the popularity of the JOURNAL and thus increase the number of subscriptions.

The Librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Entomol. Zeitschrift, XXIV, Nos. 5-22.

Societas Entomologica XXV, Nos. 3, 4.

Zeitschrift f. wissenschaftliche Insektenbiologie, VI, 4-7.

Bull. de la Soc. Imper. des Naturalistes de Moscow, 1908, Nos. 1-4.

Verhandl. d. K. K. Zool. bot. Gesellschaft in Wien, LIX, No. X; LX, No. 12.

Mittheilungen d. schweizerischen Entomol. Gesell., XII, No. 1.

Bull. de la Soc. Entomol. d'Egypte, 1910, No. 1.

Canadian Entomologist, XLII, Nos. 6-9.

Coleopterorum Catalogus, Parts 15-19.

Tijdschrift voor Entomologie, 1910, Nos. 1, 2.

Fourth Ann. Rept. Ent. Soc. Ontario, 1909.

Deutsche Entomol. Zeitschrift, 1910, Nos. 3-6.

The N. Amer. Bees of the Genus *Nomia* by T. D. A. Cockerell.

Annales Soc. Ent. Belgique, LIII.

Rept. Ent. Dept. N. Jersey Agric. Coll. Exp. Sta. for 1909.

Descriptions of Some New Genera and Species of Lepidoptera from Mexico by Harrison G. Dyar.

Mittheilungen d. Zool. Mus. Berlin, IV, No. 3; V, No. 1.

Wiener Entomolog. Zeitung, XXIX, Nos. 5-6.

Entomologische Blätter, 1910, Nos. 1-8.

Revue Russe d'Entomol., IX, No. 4.

Bolletino Lab. Zool. d. R. Siculo Sup. d. Agri. Portici, III.

Dermoptera of the U. S. Nat. Museum by Malcolm Burr.

Studies of N. Amer. Geometrid Moths of the Genus *Pero* by J. A. Grossbeck.

Bull. 141 N. Y. State Museum.

Three New Genera of Myrmicine Ants from Tropical America, by W. M. Wheeler.

Catalogue of the Odonata of N. America. R. A. Muttkowski.

Berliner Entomol. Zeitschrift, LV, Nos. 1-2.

Proc. California Acad. Sci., 4th Ser., III, pp. 57-72.

Memoirs on the Coleoptera by Thos. L. Casey.

His request of authority to have bound Henshaw's Check List of Coleoptera and the new Catalogue of Odonata was granted.

The Curator, Dr. Lutz, reported that he had spent a considerable part of the summer collecting in the field and had obtained something like 20,000 specimens of insects for the local collection, among which were many duplicates. Most of the material had been mounted and the remainder would soon be ready for exhibition. The Museum had added to the collection of Noctuidæ by purchase and Mr. John Grossbeck had donated to the local collection 300 specimens of mosquitoes representing the majority of the species to be obtained in the vicinity of New York.

Mr. Angell presented to the local collection two or three hundred specimens of Coleoptera taken along the beach at Lavalette, N. J., during the summer.

The Vice-President Mr. Osburn took the chair.

The Secretary, Mr. Barber, proposed as an active member, Mr. Carlo Zeimet, 170 William Street.

In a discussion of Mr. Davis's suggestion that space in the JOURNAL be given to short notes, several members expressed themselves pleased with the idea and the matter was referred to the Publication Committee for action.

As no formal program had been arranged the Vice-President called upon the different members to give an account of their summer's collecting experiences.

Mr. Wheat during the early summer had found a peculiar beetle in his study which he placed in a vial. Upon examining the insect a month later he found it still alive and dropped it in a cyanide bottle in which it lived for

several hours. He thought the beetle came out of an oak desk in which he had noticed a recent burrowing. The desk has been in his possession for fifteen years and his father had owned the desk for five years before him. Mr. Wheat inquired if it was possible for the larva or beetle to remain that length of time alive in the wood. Mr. Schaeffer replied that he did not think it possible.

Mr. Schaeffer exhibited a specimen of a wasp showing a *Stylops* clinging to the abdomen; a species of *Neoclytus* new to the United States, found alive in Mr. Franck's office; a lead pipe burrowed into by a beetle, *Dermestes frischii*, which was also shown. He reported that Mr. Schont had collected a very rare beetle during the past summer at Huntington, Long Island, *Elytroleptus floridanus*.

Mr. Davis stated that he had visited Sandy Hook to collect insects, having obtained a permit. He gave a description of the trees and general character of the country, and pronounced it an excellent collecting place. He showed a collection of insects representing all orders and referred particularly to those which were uncommon in this region.

Mr. Pollard exhibited a number of *Catocala* moths to show how successful one may be in sugaring for these, and two large Bombycine moths which he had bred from the pupæ. He remarked that all of his collecting had been done locally.

Mr. Groth said that most of his collecting had been done in his back yard with rather poor results, owing to the dry spell. He had particularly noticed that the spiders were uncommonly numerous probably on account of the drouth.

Mr. Hallinan exhibited some Panama beetles. He had collected some about Erie, Pa. He also noticed during the past summer that the potato beetles had turned their attention to the egg plants in preference to the potato and had done considerable damage. He spoke of the seriousness of the blight in Northwestern Pennsylvania. The San José scale which was abundant there, attacked all other fruit trees except the sour cherries.

Mr. Engelhardt exhibited a branch of *Rhododendron* which he had obtained in Prospect Park, showing the workings of *Sesia rhododendri* described by Mr. Beutenmuller. He remarked that the woodpeckers in searching for the caterpillars of the *Sesia* did considerable damage to the plant. He recommended the use of an application of tar in June as a possible prevention to the emergence of the moths. Specimens of the adult insects and larvæ were shown.

Mr. Shoemaker spent three weeks in Washington, D. C., and had made a dozen or more trips to various points on Long Island with good results.

Mr. Sherman collected also near Washington and with the aid of Mr. Schwarz and Mr. Barber had been introduced to some good collecting territory. He gave a brief description of the locality.

Dr. Southwick had been engaged in combating insects in the City Parks which had kept him busy, but he had continued to add to his collection of food plants of insects, which he offered to donate to the society, if it could

be properly cared for in the Museum. On motion of Mr. Dickerson the thanks of the society were given to Dr. Southwick for the gift.

Mr. Dickerson exhibited a specimen of *Leptura bifora* which he had taken at Brookfield, Conn.

Mr. Dickerson remarked that the San José scale was not on the decrease according to report. He spoke also concerning the seriousness of the depredations of the elm leaf beetle and the problem of fighting it.

Mr. Angell had collected many Coleoptera along the beach at Lavalette, N. J. While walking along the shore he had seen many thousand specimens of *Harpalus caliginosus* coming down to the drift line in search of the washed up insects which he saw them seize and devour.

Mr. Comstock stated that he had specialized this summer in back yard collecting and had seen 18 species of butterflies in his yard in Newark.

Mr. Osburn had gone to Europe expecting after completing his work at the Naples Station to do some collecting, but was unexpectedly called home and had only a short collecting trip to the Island of Capri which he briefly described.

Society adjourned.

H. G. BARBER,
Secretary.

THE NEW YORK ENTOMOLOGICAL SOCIETY.

Organized June 29, 1892.—Incorporated June 7, 1893.

The meetings of the Society are held on the first and third Tuesday of each month (except June, July, August and September) at 8 P. M., in the AMERICAN MUSEUM OF NATURAL HISTORY, 77th Street and Eighth Ave.

Annual dues for Active Members, \$3.00.

Members of the Society will please remit their annual dues, payable in January, to the treasurer.

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For Sale by the New York Entomological Society.

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- FALL, H. C. Synopsis of the species of Acmaeodera of America, north of Mexico. 36 pp. 75c.
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- NEUMOEGEN and DYAR. A preliminary revision of the Bombyces of America north of Mexico. \$1.50.
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The North American Nymphulinæ and Scopariinæ. 31 pp. 55c.
- DYAR, H. G., and KNAB, FREDERICK. The larvæ of Culicidæ classified as independent Organisms. 61 pp., 13 pl. \$1.50.
- KEARFOTT, W. D. Revision of the North American species of the genus Choreutis. 20 pp. 50c.
- CAUDELL, A. N. The genus Sinea of Amyot and Serville. 11 pp., 1 pl. 35c.
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- BUENO, J. R. DE LA T. The Genus Notonecta in America North of Mexico. 24 pp., 1 pl. 60c.

The above papers will be sent on receipt of price by

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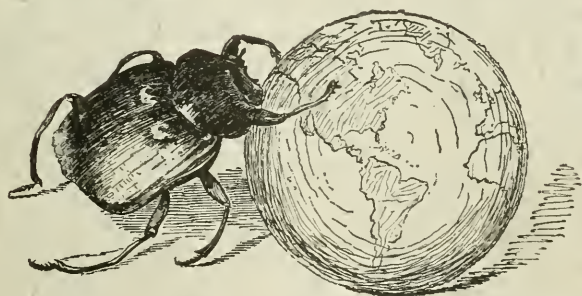
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F. E. LUTZ.

R. C. OSBURN.
W. M. WHEELER.

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NOTES ON COLEOPTERA COLLECTED IN NORTHERN GEORGIA—II.

BY C. W. LENG,

WEST NEW BRIGHTON, N. Y.

During the last two weeks of July, 1910, Mr. William T. Davis and the writer revisited Clayton, Ga., and continued the collections recorded in this JOURNAL, Vol. XVIII, p. 71. Our plan was to be on the ground a month later than in the previous year so as to procure the later species, in which we were successful, and to devote more time to the valleys between the mountains on which we had spent our days in 1909. Through the help of Mr. S. B. Ransom, we were also able to collect for several days in the forest about Tuckalege Creek; and, under the guidance of Mr. J. S. Bleckley, to reach the summit of Rabun Bald, an elevation of about 4,800 feet.

The heavy rains, which occurred nearly every day in June, 1909, were much less frequent in July, 1910, and their absence may have contributed to our success in collecting Coleoptera. Of the species found in 1909, about two-thirds were found again in 1910, and the place of the missing species was taken by a somewhat greater number of species not previously seen. Most of these have been identified and the subjoined list covers 245 species additional to those found on our first visit.

Concerning some of the species we found in 1909 and failed to find in 1910, it may be said with reasonable certainty that the season for many longicorns and click-beetles is over by mid-July. Thus we

did not find in 1910 a single *Michthysoma* although we went several times to the locality at which it had been plentiful and searched diligently for it. *Leptura aurata*, *Corymbites 3-vittatus* and other interesting species of the June fauna were similarly absent. The total number of species of Cerambycidae caught in the two years was 70; of which 28 were found in both years, 28 in June, 1909 only, and 14 in July, 1910. Making some allowance for our failure to find species that were actually present, it is still evident that June is the season for Cerambycidae.

On the other hand the Chrysomelidae were apparently more abundant, in July, 1910. 63 species were found against 46 in the previous year of which 27 were the same. Large additions were made in other families feeding on leaves, so that the total number of species caught in July, 1910, was finally greater than that recorded for June, 1909.

The result of haunting the valleys part of the time and particularly the cultivated fields and creek bottoms was to add to the list many southern species that were present in spite of the mountains rather than on account of them. Thus *Pterostichus acutus* is a species of the warm lowlands and we found it under stones beside a brook in a sheltered pasture. *Lema solani* was found in some numbers on *Solanum nigrum* at Tallulah Falls. Neither species would be found on the mountain side.

Another result of hunting in the creek-bottoms was the finding of a few Dytiscidae and Hydrophilidae in pools caused by the overflowing of the creeks after the heavy June rains. These have been placed in Mr. Roberts' hands for identification.

The expedition to the summit of Rabun Bald was interesting but not especially productive. That mountain is clothed to the top with forest of the same general character as that found on the lower mountains though rather stunted at the summit. We collected diligently for three hours, beating, sweeping and sifting until driven out by a thunder storm. The species we caught were practically the same as those caught at lower levels, *Cicindela sexguttata*, for instance, occurring all the way up the mountain to the summit. We found a large ant hill near the top of this mountain from which we obtained *Cremastochilus castanea*, the identification being confirmed by Mr. Louis H. Joutel, who has made a special study of this genus.

Adjoining Stekoa Creek are fields bordered with various bushes

and in part, quite sandy. We found the collecting very good in these fields and spent part of several days in sweeping the weeds and grasses and in beating the bushes. In the sandy portion one day Mr. Davis found an *Amphicoma*, buzzing as it flew much like a bee. The locality is much further south than any given in Dr. Horn's paper on the genus, but I learn that Mr. Schwarz has found it at Round Knob, N. C. The species we found resembles *vulpina* closely.

In low ground near these fields we came upon a pond with a growth of sedges in its shallower parts on which we found *Donacia subtilis*, apparently identical in every respect with our familiar Staten Island *Donacia* of similar food plant. Mr. Davis, who captured nearly all the specimens by wading in the pond, pronounced the food plant a species of *Sparganium*.

Podabrus protensus was caught in June, 1909, as well as in July, 1910; the color of the elytra is very much paler in the June specimens. *Photinus marginellus* var. *castus* Lec. is also conspicuously pale but apparently not on account of immaturity. We found no darker specimens nor did we observe any variation in color.

Agrilus fuscipennis, of which one specimen was found by Dr. Love in 1909, was found by Mr. Davis by beating persimmon. It was not abundant but what few were taken were on this tree which is therefore probably its food plant.

Mr. Davis planted a number of traps, consisting of bottles baited with molasses, beer, etc., the usual "sugar" mixture and caught a large number of Carabidæ in that way. The number of *Carabus limbatus* caught by these traps was surprising, the more so as search in the usual hiding places failed to disclose any. For comparison we put out a few traps baited with meat and caught in that way quite a different set of species, including Silphidæ, *Onthophagus* and Aleocharini. Of the last named we also obtained a goodly number by sifting and I am indebted to Dr. A. Fenyés for their identification.

Mr. E. A. Bischoff has also been good enough to go over all the Rhyncophora we caught and his familiarity with the characters of the species should ensure a high degree of accuracy in the names used.

Our labors in sifting did not produce the number of Pselaphidæ that we had hoped to find. Dr. Leconte's results in the nearby Nakutshi Valley were much better, but it appears that he must have been there in May. There may also be a considerable difference in

the fauna though the localities are not far distant. The Nakutshi Valley is drained by the Tallulah River, a larger stream than the Stekoa Creek on whose borders we worked. In the Carabidæ, for instance, Dr. Leconte found *Pterostichus manicus* common while we have not found it at all. He also found *Cychnus violaceus* for which in fact the Nakutshi Valley is the type locality. Not a single specimen of this species rewarded our search until Mr. Ransom donated one which however we found had been taken at Burton, Ga., ten miles west and on the headwaters of the Tallulah. We found again a goodly number of Cychnini, especially in the deeper valleys about Tuckalege Creek, where they were hiding under the loose bark of long dead, fallen trees, but the species were the same as those found the previous year, and the fact seemed to be established that *Cychnus violaceus* occurred in the valleys drained by the Tallulah but not in those drained by Stekoa Creek.

We covered in our walks a great deal of the ground worked over the previous year and especially Black Rock Mt., which being unburned and near the village was convenient for our purpose. We found, however, that Pinnacle Mt., also near the village, was very attractive to an entomologist. It rises to the same height as Black Rock, about 3,700 feet, is in great part unburned and has on its northern face extraordinary deep deposits of old leaves. The woods at its base are deeper and more extensive and the route to it leads through fields instead of by the road, so that the collecting is on the whole more varied. This mountain culminates in a sharp rocky peak from which a far reaching view of the surrounding country is to be had. On its southern slope there is a deep and large ravine with steep sides, dripping moisture into which we did not penetrate but live in hopes that we may do so at some future trip. On the topographic map issued by the U. S. Geological Survey the name Pinnacle is applied to the mountain locally known as Oakley Mt. The peak we visited is much nearer to the town and is unnamed on the map referred to.

The following is the list of additional species found in July, 1910, those taken by Mr. Davis alone being marked (Ds.).

LIST OF SPECIES.

- Cychrus violaceus* Lec.
Clivina americana Dej. (Ds.).
Schizogenius planulatus Lec.
Pterostichus acutus Lec.
sayi Brullé (Ds.).
Badister notatus Hald (Ds.).
Platynus 8-punctatus Fab. (Ds.).
Lebia viridis Say.
pumila Dej.
Dromius piceus Dej.
Plochionus timidus Hald.
Pinacodera limbata Dej.
platicollis Say.
Apenès sinuata Say.
Harpalus erythropus Dej.
spadiceus Dej.
vagus Lec.
Dineutes robertsi Leng.
Necrophorus americanus Oliv.
marginatus Fab.
orbicollis Say.
Silpha americana L.
Ptomophagus consobrinus Lec.
Cyrtusa picipennis Lec.
egena Lec.
Tmesiphorus costalis Lec.
Myllæna intermedia Er.
Bolitochara 3-maculata Er.
Aleochara brachyptera Fourc.
bipustulata L.
defecta Casey.
curtula Goetze var. *lustrica* Say.
Zyras n. sp. (fide Fenyès).
Dinopsis americanus Kraatz.
Gyrophæna vinula Er.
corruscula Er.
sp.?
Hoplandria lateralis Mels.
Oxyptoda sp.?
Platandria sp.?
Atheta picipennis Mann.
sp.
Acylophorus flavipes Lec. (Ds.).
Staphylinus fossator Grav. (Ds.).
femoratus Fab.
cinnamopterius Grav.
Stenus virginæ Casey.
Philonthus apicalis Say.
latulus Say.
lomatus Er.
asper Hn. (Ds.).
Gastrolobium bicolor Grav.
Apterallium carolinæ Casey.
Stilicus opaculus Lec.
Tachinus fumipennis Say.
Oxytelus insignis Grav. (Ds.).
Tachyporus nanus Er.
jocosus Say. (Ds.).
Boletobius cinctus Grav.
Scaphisoma convexa Say.
Scaphidium 4-guttatum Say.
Phalacrus politus Mels.
Olibrus pallipes Say.
Arthrolips marginicollis Lec. (Ds.).
Hippodamia parenthesis Say.
Brachyacantha 4-punctata Mels.
Scymnus americanus Muls.
collaris Mels.
cervicalis Muls.
terminatus Say.
fraternus Lec.
tenebrosus Muls.
Megalodacne heros Say.
Tritoma festiva Lac.
flavicollis Lec.
Pycnomerus sulcicollis Lec. (Ds.).
Silvanus planatus Germ.
Cucujus clavipes Fab.
Mycetophagus punctatus Say.
flexuosus Say.
serrulatus Casey.
Hister defectus Lec.
dispar Lec.
perplexus Lec.
exaratus Lec.
carolinus Payk.
Epierus regularis Beauv.
Saprinus sp.

- Carpophilus brachypterus* Say.
Phenolia grossa Fab. (Ds.).
Nitidula bipustulata L.
Ips obtusus Say. (Ds.).
 fasciatus Oliv.
Cryptarcha ampla Er.
Cychramus zimmermanni Horn (Ds.).
Corticaria sp.
Tenebrioides corticalis Mels.
Dryops lithophilus Germ.
Deltometopus amanicornis Say.
 rufipes Mels. (Ds.).
Dromaeolus marseudi Bonv.
Nematodes atropos Say. (Ds.).
Alaus myops Fab.
Monoerepidius vespertinus Fab. (Ds.).
Elater collaris Say.
 militaris Harr. (Ds.).
Megapenthes granulatus Mels.
 rufilabris Germ. (Ds.).
Glyphonyx testaceus Mels (Ds.).
Melanotus communis Gyll.
 fissilis Say.
Leptoschema discalceatum Say.
Estodes tenuicollis Rand.
Asapha bilobatus Say.
Cebrio bicolor Fab.
Drapetes geminatus Say. (Ds.).
Buprestis fasciata Fab.
Chrysobothris 6-signata Say.
Taphrocerus gracilis Say.
Eros thoracicus Rand. (Ds.).
Pyropyga decipiens Harr. (Ds.).
Pyractomena angulata Say. (Ds.).
Photinus marginellus var. *castus* Lec.
Tytthonyx erythrocephalus Fab.
Podabrus protensus Lec.
Telephorus lineola Fab.
Ditemnus bidentatus Say.
Malthodes concavus Lec.
Pseudobaeus oblitus Lec. (Ds.).
Thanasimus dubius Fab.
Cregya mixta Lec.
Petalium bistriatum Say.
Eupactus nitidus Lec.
Trypophytus sericeus Say.
Cænocara bicolor Germ. (Ds.).
Platycerus quercus Web.
Onthophagus striatulus Beauv.
Odontæus cornigerus Mels. (Ds.).
Dialytes striatulus Say.
Aphodius fimetarius L.
 stercorosus Mels.
Balboceras lazarus Fab.
Geotrupes balyi Jek. (Ds.).
Amphicoma vulpina Hentz.
Hoplia modesta Hald.
Serica georgiana n. sp.¹
Lachnosterna grandis Smith.
Cyclocephala immaculata Oliv.
Xyloryctes satyrus Fab.
Strategus antæus Fab.
Euphoria fulgida Fab.
Cremastochilus castaneæ Knoch.

¹ SERICA GEORGIANA n. sp. Oblong-ovate, wider behind, especially in female, piceo-testaceous above and beneath; clypeus closely, moderately coarsely punctate, tumid or swollen, separated from the front by a transverse groove which extends across the head in front of the eyes; front margin of clypeus reflexed with an incision on each side; head and thorax finely, distantly punctate; elytra sulcate with confused punctures at bottom of each sulcus; beneath glabrous, finely distantly punctate. Penultimate ventral segment simply convex in female, impressed at middle of posterior margin in male with a few wrinkles on either side of the impression. Length 9 to 11 mm.

Described from four males and one female in my collection from the vicinity of Clayton, Ga; male and female from Highlands, N. C., are in Mr. Frederick Blanchard's collection. Elevation 2,000 to 4,000 feet. June and July.

- Trichius delta* Forst.
Orthosoma brunneum Forst.
Prionus imbricornis Linn.
Phymatodes variabilis Fab.
Chion cinctus Drury (Ds.).
Eburia 4-geminata Say.
Romalium atomarium Drury (Ds.).
Batyle suturalis Say. (Ds.).
Arhopalus fulminans Fab. (Ds.).
Strangalia bicolor Swed. (Ds.).
Typocerus lugubris Say.
Leptura emarginata Fab.
 proxima Say.
Hyperplatys maculatus Hald.
Tetraopes canteriator Drap (Ds.).
Donacia subtilis Kunze.
Lema solani Fab.
Bassareus congestus Fab.
 formosus Mels.
Cryptocephalus guttulus Oliv.
 4-guttatus Suffr.
 mutabilis Mels.
 obsoletus Germ.
 calidus Suffr.
Pachybrachys intricatus Suffr.
 carbonarius Hald.
 infaustus Hald.
Monachus ater Hald.
Diachus auratus Fab. (Ds.).
Glyptoscelis pubescens Fab.
Rhabdopterus picipes Oliv.
Typophorus cancellus Fab. (Ds.).
Luperodes davisi Leng. (Ds.).
Trirhabda tomentosa Linn. (Ds.).
Galerucella americana Fab.
 notulata Fab.
Cedionychis thoracica Fab. (Ds.).
 limbalis Mels.
 vians Ill. (Ds.).
Disonychia 5-vittata Say. (Ds.).
Lactica iris Oliv.
Systema elongata Fab.
 marginalis Ill. (Ds.).
Longitarsus testaceus Mels.
Epitrix fuscata Crotch (Ds.).
 cucumeris Harris (Ds.).
Chatocnema confinis Cr. (Ds.).
 denticulata Ill.
Haltica chalybea Ill. (Ds.).
 amana Horn.
Odontota nervosa Panz.
Cassida bivittata Say. (Ds.).
Coptocycla purpurata Boh. (Ds.).
Bruchus scutellaris Fab.
 nigrinus Horn.
 alboscuteellatus Horn.
Hapladrus femoratus Fab. (Ds.).
 ater Lec. (Ds.).
Xylopinus anescens Lec. (Ds.).
Tenebrio castaneus Kn.
Alphitobius diaperinus Panz.
Melandrya striata Say.
Emmesa labiata Say.
Eustrophus repandus Horn.
Mordellistena bicinctella Lec.
Xylophilus notatus Lec. (Ds.).
Anthicus confinis Lec.
Pyrota germari Hald.
Nemognatha piezata Fab. (Ds.).
Rhipiphorus pectinatus Fab.
 limbatus Fab.
 dimidiatus Fab. (Ds.).
Myodites styloides Newm.
Attelabus analis Ill.
Pissodes deodara Hopk.
Pachylobius picipiorus Germ.
Lixus scrobicollis Boh.
Otidocephalus scrobicollis Boh.
 levicollis Horn.
Tachypterus 4-gibbus Say.
Pachytichius discoides Lec.
Anthonomus sulcifrons Lec.
 nubilus Lec.
Prionomerus calceatus Say.
Conotrachelus albocinctus Lec.
 posticatus Boh.
Acalles carinatus Lec.
Calliodes nebulosus Lec.
 acephalus Say.
Pelenomus sulcicollis Lec.
Pseudobaris nigrina Say.

angusta Lec.
Centrinus scutellum-album Say.
Sphenophorus pertinax Oliv.

cited in the previous list (June,
1910):

Dinacutus vittatus,
Mycetophagus pluriguttatus,
Atelabus nigripes.

The following were erroneously

MISCELLANEOUS NOTES ON COLLECTING IN GEORGIA.¹

BY WM. T. DAVIS,

NEW BRIGHTON, STATEN ISLAND, N. Y.

As Mr. Charles W. Leng and I visited Clayton, Ga., in 1910, about a month later than in 1909, we had the pleasure of getting better acquainted with some of the resident species of Cicadas, known quite appropriately as "jar" or "July flies" by the natives. *Cicada sayi* was quite common about the town and in all the cultivated tracts that we visited. *Tettigera hieroglyphica* was still singing, but confined more to the woodland, and a third species resembling *Cicada lyrice*, which has since been named *Cicada engelhardti*, was found only in the woodland. Attracted by the songs of this insect, we could with a powerful glass see them in the trees, and note the black thorax with prominent central fulvous spot. The distribution of Cicadas will yet become as interesting a study as that of tiger beetles. Why *Cicada sayi* should occur in considerable numbers about Clayton, Ga., and be absent from parts of New Jersey, where it is generally quite common, is an interesting fact worthy of consideration.

Though we collected the same species of tiger beetles as we did in 1909, they were not as numerous, owing to the lateness of the season. The exception to this was *Cicindela unipunctata*, which was quite plentifully distributed in the woods and along the wood paths. The individuals that we have seen at Plainfield, Lakewood and Lakehurst in New Jersey, did not fly when disturbed, but at Clayton they flew almost as well as the other native species. The most interesting *Cicindela* observation was made on July 25, on the trail leading along Tuckoluge Creek, where I saw a male *Cicindela sexguttata* apparently

¹ Continued from page 82, Vol. XVIII, 1910.

in copulation with a female *Cicindela punctulata*. The pair were promptly collected to avoid chances of error in regard to sex.

We set a great many trap jars baited with "sugar" mixture in the woods, and as a result captured numerous ants and beetles and a great many specimens of *Ceuthophili*. The latter have been identified with reasonable certainty as *Ceuthophilus lapidicola*, *Ceuthophilus uhleri* and *Hadenæcus putcanus*. Among the beetles *Carabus limbatus* fell into the traps in great numbers. Later, when they were examined, it was found that there were 24 males and 49 females. A similar collection of *limbatus* had been made in June in company with Mr. Ernest Shoemaker, along the Potomac river near Washington, D. C., and contained 22 males and 49 females. A comparison of these two collections showed that the specimens from the mountains of Georgia averaged smaller than those from further north. The length of the elytra was measured with the result that Georgia specimens averaged 12.73 mm., while those from along the Potomac averaged 13.67 mm. There were many specimens with the elytra only 12 mm. in length in the Georgia lot, while there was but one of that length among those from the vicinity of Washington. Again there was none as long as 15 mm. in the Georgia collection, while there were six of that length among those from the Potomac. *Carabus* has its best and greatest development in northern latitudes.

We found a pair of *Canthon nigricornis* rolling a sheep dropping, and a *Canthon chalcites* in a decaying fungus. Fifty-eight specimens of the larger *Canthons* were examined, and we might have inspected several hundred, for they were very common. Of this number fifty-seven were *chalcites* and only one *lævis*. Last year *lævis* was in greater proportion. In one spring there were four *Canthon* balls that had been recently lost to their owners by rolling down hill into the water.

Near the last of the month of July, while waiting for a train at Cornelia, Ga., we rambled in a small woods and along a path where there were some *Cicindela rufiventris*. Here we also found the excrement of some small mammal, probably a skunk or an opossum, containing the wing covers and hard parts of a number of insects. In this excrement there were a number of *Canthon viridis*. This was the first time we had found it feeding, for it usually occurs on low vegetation or under loose material on the ground.

On July 11 I saw a robber-fly capture a *Cicindela sexguttata* on the trail up the side of Black Rock Mt. When the beetle was secured the fly did not alight immediately, but for a considerable time poised itself in the air, evidently thus preventing the active beetle from getting hold of any solid object with its legs. When the beetle was dead or nearly so, the fly alighted quickly enough.

Along the same mountain path I found two burrows of the brightly colored wasp *Chlorion ichneumonca*. I saw one of the wasps on the 12th of July filling up her burrow, throwing in the dirt a little at a time, and pounding it down with her head. While the pounding was in progress she made a buzzing noise, which first attracted my attention. Having finished off the surface like the surrounding ground, she departed and I dug into the nest, finding a chamber three fourths of an inch in diameter and two inches below the surface, containing two large *Atlanticus dorsalis* and one smaller one. On July 15 an *ichneumonca* wasp was found at work filling in a burrow which branched a little way down, each branch ending in a chamber six inches below the surface. One of the chambers was stored with five *Atlanticus dorsalis*, four large ones and one little one, while the other held three large *dorsalis*, two females and a male. On Long Island, N. Y., we have seen this species of wasp carrying a *Conocephalus triops* to her burrow, so it makes use of various species of Orthoptera as conditions dictate.

Experiments have shown that many insects do not get on very well in the matter of flight when their antennæ have been removed. This does not appear to be true of some of the grasshoppers, for on July 11 a large female *Hippiscus* was observed flying about very well without antennæ. Later I found a female *Schistocerca americana* without antennæ, and she also seemed none the worse for her loss and flew in a normal manner.

The day we climbed Rabun Bald Mt. we were pleased to find several nests of the mound building ant, *Formica exsectoides*. They began to appear at about four thousand feet elevation, and some of the nests were two and one half feet high. In one low mound, I found the red *exsectoides* associated with the black *Formica subsericea*. This was probably a new nest of *exsectoides*, started by temporary parasitism in the manner pointed out by Professor Wheeler. In Prince George Co., Md., *exsectoides* builds large mound nests on

ground less than 300 feet above the sea, and in New Jersey, west of Matawan, there are several low nests about 100 feet above the sea. This ant is not common in the low lands of New Jersey.

The beautiful *Argynnis diana* was flying at the time of our visit to Clayton. Two females were seen and one of the many males was captured, but they were usually in a great hurry.

As nearly all of the water is actively engaged in getting down hill in the vicinity of Clayton, there are not many pond holes and swamps, so we saw but few of the dragon flies that frequent such places. *Libellula flavida* was quite common. Two *Tachopteryx thoreyi* were seen along War Woman Creek on July 25, and one alighted on Mr. Leng's light-colored shirt. Alighting on light-colored garments appears to be a specialty with this large dragon fly, and we have known them to act in this manner on several occasions. They have also the habit of resting on the trunks of trees, where owing to their gray color they can hardly be detected. From such a place of vantage they sally forth after their unsuspecting victims.

PSAMMOCHARIDÆ: CLASSIFICATION AND DESCRIPTIONS.

BY NATHAN BANKS,
EAST FALLS CHURCH, VA.

The Psammocharidæ are a family in the superfamily Scolioidea, which includes also the Scoliidæ, Thynnidæ, Mutillidæ, and Sapygidæ. The earlier writers on the family had no definite arrangement though they erected a number of genera, most of the species being grouped in five of these genera, *Pompilus*, *Priocnemis*, *Pepsis*, *Agenia*, and *Ceropales*. *Pompilus* and *Agenia* are preoccupied, so other names must replace them. A prime division was made on the number of submarginal cells, and this character is still used in the latest (Ashmead) classification. I do not consider it of great value, indeed one species has specimens with two cells in one wing and three in the other, while other specimens have two or three in both wings. Whether the hind tibiæ were irregularly spined, serrately spined, or

unarmed was also a prime character with many writers. Various species of *Pseudagenia* have distinct spines on the hind tibiæ, and the males of certain *Priocnemis* have the hind tibiæ almost mutic.

Thomson was the first to discover a really valuable character in the furrow on the second ventral segment. This unfortunately breaks down in the males of some *Pseudagenia*, but by using it in connection with a hitherto unmentioned venational character (as in the following table) one may recognize two groups. Fox, and others, laid much importance on the development of the labrum. In *Noto-cyphus* and *Ceropales* it is entirely exposed, but in many forms it is more or less exposed, and in *P. maura* and *P. interrupta* it is usually so much exposed that Ashmead put these in the group with *Ceropales*. Mr. Rohwer informs me that Ashmead's type of *Agcnioxenus* is merely a specimen of *P. interrupta*.

Kohl made a classification of the family, dividing the *Pompilus* group up into many sections, sometimes without names. One of his main characters is the position of the origin of the cubitus in the hind wing, whether before, interstitial with, or beyond the end of the cell beneath. I doubt if this character is stable for the European forms, but certainly when applied to our species it is full of pit-falls, and should be used only in connection with other structures that may check it.

Ashmead, with catholic liberality, accepted all the preceding classifications and merged them into one, adopting in some sense nearly all of the former genera and making numerous new ones. His greatest mistakes were in trying to apply the character of the exposed labrum in a strict sense, and in using Kohl's character of the position of cubitus in the hind-wing for our American species. Many of his genera represent natural groups, but his characters for them are often inconstant or inapplicable. It is impossible to make a new classification in a day, and in presenting that below I have used all that I could find of value in previous systems and have had the fortune to discover a few additional points that may be of use in arranging our species.

Ashmead's genus *Pompilinus* is a good one, when made to include some other forms, but his distinguishing characters are not usable; however, I find that this genus, and one or two allied ones, may be separated by the absence of erect hair on the metanotum. I am not

certain as to the first generic name for this group, and used *Pompiloides* Rad. Disregarding the number of submarginal cells (and one species of this genus is variable in that character) the name, *Aporus*, would be available, and I presume, will be adopted, eventually. Ashmead's genus *Spilopompilus* may be recognized by the vestiture of the basal abdominal segment, it is the same as *Episyrus*. Ashmead's *Batazonus* and *Pacilopompilus* may together form another genus based on an unused character. *Arachnophroctonus* Ashmead is closely allied, but may be kept separate on other unused characters. The absence or presence of spines on the under surface of the last joint of the hind tarsi will distinguish the two groups of the old *Priocnemis*, and the absence or presence of erect hair on the metanotum will divide the old *Agenia*. The shape of the third submarginal cell has often been used, and I have used it somewhat in the table, but am aware that it breaks down in other groups, and may not therefore be constant in those I have used. However, other characters are used in connection with it. I know of no character to separate the species considered as belonging to *Mygnumia* from the large species of the old *Priocnemis*. Mr. Rohwer informs me that the typical *Mygnumia* is very different from our species so placed, therefore the genus may be valid, but our species belong with the large species of *Priocnemis* in a group called *Priocnemoides* by Radoszkowski. There may be an older name for this group. Under *Psammochares* I have tabulated the groups that can be distinguished by characters in the females; but until the males can also be distinguished I prefer to keep them all under the one name. Our *P. virginensis* is very close to the type of *Anoplius*. *P. illinoisensis* will also go in this section. *Lophopompilus* was made for large *Psammochares* with an excised clypeus. I have not seen the genotype, but if not congeneric with our *P. athiops* then Ashmead's *Pompilogastra* is available. The type of *Calicurgus* is extremely close to our *Priocnemis alienatus*, but the character used for the genus is not constant in the two European specimens I have, nor in our species, therefore I do not use the name. The type of *Aporus* is structurally close to *P. marginatus*, it is not closely related to the species placed in this country in *Aporus*, therefore I make a new name for our species. I have not seen the type of *Agenia*, but some species have the metanotum hairy as in *Pseudagenia*. *Agenia* is preoccupied in the Hemiptera, and

I make a new name for our species without hairs on the metanotum, not knowing whether it will include the typical *Agenia* or not. The type of *Melanaporus* Ashm. is a two-celled form of *P. argenteus* or a close ally.

TABLE OF SUBFAMILIES.

1. Claws of hind tarsi bent at right angle; antennæ situate considerably above the clypeus; labrum exerted for its entire length; metanotum at base bilobed, the spiracle in a depression opening forward.....*Ceropalina*.
Claws not bent at right angle; spiracles not in such a depression.....2
2. Metanotum flat above, not bilobed at base, the spiracles situate nearly twice their length from the anterior margin of metanotum; labrum exerted for its entire length; no spines under last joint of hind tarsi....*Notocyphina*.
The spiracles not much more than their length from the anterior margin of metanotum; labrum never more than partially exerted.....3
3. A transverse furrow on the second ventral segment (absent in some males); in the fore-wings the second discoidal cell at base is right-angled, and without a distinct pocket.....*Pepsina*.
No such furrow on the second ventral segment; in fore-wings the second discoidal cell has a small pocket at base; the hind tibiæ never serrate, always more or less irregularly spined.....*Psammocharina*.
The *Ceropalina* has, in our fauna, but one genus—*Ceropaless*.

The *Notocyphina* include two genera:

1. With a distinct malar space between eyes and base of mandibles; male antennæ crenulate below; labrum broader than long; hind tibiæ spined*Allocyphona*.
Without a malar space; male antennæ not crenulate; hind tibiæ barely spined; labrum longer than broad.....*Notocyphus*.

The *Pepsina* include several genera, some of which may be divided.

1. Hind tibiæ without spines or only very weak ones, never serrate; in hind-wings the transverse median vein ends before the cubitus; male often without ventral furrow, last tarsal joint without spines beneath or few very weak ones (*Ageniellini*)2
Hind tibiæ more or less serrately spined, if (♂) nearly smooth, then the transverse median vein of hind-wings is not before cubitus (*Pepsini*)...3
2. Metanotum with erect hair above.....*Pseudagenia*.
Metanotum without erect hair above.
Ageniella n. gen. (type, *Agenia accepta* Cr.).
3. Wings rudimentary*Myrmecosalius*.
Wings well developed.....4
4. Last joint of hind tarsus without spines beneath; in the hind-wings the transverse median vein ends before or at the cubitus.....*Cryptocheilus*.

- Last joint of hind tarsus distinctly spined beneath; in hind-wings the transverse median vein ends at or beyond the cubitus.....5
5. In fore-wings the first recurrent vein meets the second submarginal cell at the basal third; in hind-wings the transverse median vein is farther beyond the cubitus than the width of the cell; last joint of hind tarsi about twice as long as the penultimate.....*Pepsis*.
- In fore-wings the first recurrent vein ends beyond the basal third of the second submarginal cell; the last joint of hind tarsi is not twice as long as the penultimate*Priocnemoides*.

The Psammocharinæ include a number of generic groups the principal of which can be separated by the following table. There are other sections which further study will doubtless show to be valid.

1. Pronotum longer than mesonotum, nearly flat above, scarcely arched longitudinally, last joint of hind tarsi without spines beneath; tarsi I of female without comb; no erect hair on the metanotum.....2
Pronotum shorter than mesonotum, plainly arched longitudinally.....3
2. With two submarginal cells.....*Planiceps*.
With three submarginal cells.....*Pedinaspis*.
3. Basal abdominal segment with appressed pubescence, different from that on the following segments; pronotum with the posterior margin membranous and often white; third cell as broad as long.....*Episyrion*.
Basal segment of abdomen not with pubescence different from the following segments4
4. No erect hair on the metanotum above, only pubescence.....5
Erect hair on the metanotum above.....8
5. Metanotum produced angularly at the posterior corners; but two submarginal cells*Aporinellus* n. gen. (type, *Aporus fasciatus* Sm.).
Metanotum not produced angularly behind; usually three submarginal cells6
6. Metanotum transversely striate; marginal cell as long as distance to tip; third cell long, and wide above.
Ridestus n. gen. (type, *Psammochares transversalis* Bks.).
Metanotum not transversely striate.....7
7. Marginal cell long, hardly its length from tip of wing; third submarginal cell wide above; basal vein of fore-wings interstitial with the transverse*Sericopompilus*.
Marginal cell short, subtriangular, much more than its length from tip of wing; third submarginal cell much narrowed, triangular, or petiolate above; basal vein usually a little before the transverse.....*Pompiloides*.
8. A short longitudinal impressed line or groove on posterior part of the pronotum; head nearly or fully as broad as long; not wholly black species9
No such impressed line or groove on the pronotum; often wholly black.

Psammochares.

9. Metanotum distinctly grooved at base; upper margin of clypeus nearly evenly convex *Arachnophroctonus*.
 Metanotum not grooved at base; upper margin of clypeus sinuate or zigzag *Batazonus*.

The groups or subgenera of *Psammochares* distinguishable in the female only are as follows:

1. Clypeus plainly emarginate in middle..... *Lophopompilus* (*athlops*, *atrox*).
 Clypeus not more than evenly concave..... 2
 2. No distinct tarsal comb..... *Anoplus* (*illinoisensis*, *virginiensis*).
 A distinct tarsal comb..... 3
 3. Third joint of antennæ very short; hardly longer than first.

Sophropompilus (*ingenuus*).

Third joint of antennæ much longer than first..... *Psammochares*.

The discovery of additional characters will doubtless raise these to generic ranks.

Pompilogastra equals *Lophopompilus*, and *Pycnopompilus* equals *Psammochares*.

***Psammochares ithaca*, new species.**

Female.—Clypeus slightly hairy, rather rounded in front, antennæ slender, but not very long, the basal joint not hairy, the third much longer than first, but second plus third hardly as long as width of vertex, the short furrow above antennæ does not reach ocelli, anterior ocellus not more than diameter from laterals, and these about as near to each other as to eyes; vertex straight across, with long erect hair, as also on the face; pronotum angulate behind, metanotum short, rounded, with a broad deep median furrow, slightly hairy above, more dense on sides; abdomen not flattened, bristly at tip, and ventral segments with a few hairs on each; legs long, the tarsi long and slender, no distinct comb on anterior tarsus, the spines short and straight, the long spur on hind tibia hardly more than one-half the metatarsus; spines beneath last joint of hind tarsi, claws long, with tooth, almost cleft. Wings black, paler on basal part, but not as much difference as in *P. virginiensis*, second submarginal quadrate, receiving the first recurrent vein near tip, third submarginal as large, but narrowed above, receiving the second recurrent a trifle beyond the middle, this vein arising from beyond middle of anal cell, basal veins interstitial, in hind wings the cubitus is interstitial with end of the cell. Color wholly black; belongs to section of *Anoplus*.

Expanse 16 mm.

From Ithaca, N. Y., early July; related to *P. virginiensis* but distinct by grooved metanotum.

***Psammochares bellicosus*, new species.**

Male.—Black, iridescent blue and purple, a patch of silvery each side between antennæ and eyes. Clypeus truncate below, only a little hairy;

antennæ moderately stout, third joint fully as long as the first; a line to anterior ocellus, this not much more than diameter from the laterals, and these a little nearer to each other than to eyes; vertex slightly rounded, face and vertex long-haired; pronotum with only a few hairs, arcuate behind; metanotum with short hairs, quite suddenly declivous behind; abdomen rather broad, depressed, last segment dull black, others iridescent, venter with few hairs; legs strongly spined, long spur of hind tibia two-thirds of the metatarsus, no spines below on last joint of hind tarsus, nor other tarsi. Wings deep black, iridescent; second submarginal cell a little longer than broad, receiving the first recurrent vein close to tip; third submarginal cell broader than long, narrowed above, receiving the second recurrent at middle, this vein arising from beyond middle of the anal cell; basal vein interstitial with the transverse; in hind-wings the cubitus is interstitial with the end of the cell.

Length 15 mm.

From Palmerlee, Arizona, Sept. (Biederman).

Psammochaeres gracilicornis, new name.

A new name for the *Ps. tenuicornis* Bks., which I find is preoccupied by Tournier in 1889.

Psammochaeres astur, new species.

Female.—Black; clypeus short-haired, bristles very distinct, lower margin truncate; antennæ moderately slender, basal joint not hairy, third joint very long, second plus third as long as vertex width, a line to anterior ocellus, this scarcely more than diameter from laterals, and these nearer to eyes than to each other; vertex straight; head above the antennæ with long hair, face and especially vertex very narrow; pronotum plainly angulate behind; metanotum sloping, long-haired all over, with a median groove; abdomen dull black, basal segment hairy at base, apical segment finely hairy, ventral segments with a few hairs before tips; legs slender, very fine short hairs on femora, spines strong, tarsal comb long, long spur of hind tibia nearly two-thirds of the metatarsus, spines below last joint of hind tarsus; claws with rather small tooth. Wings black, rather darker on tip, second submarginal cell longer than broad, receiving the first recurrent vein much beyond the middle, third submarginal cell about as long as second, and only a little narrowed above, receiving the second recurrent vein before middle, this vein arising from beyond middle of anal cell; basal vein before or interstitial with the transverse; in hind-wings the cubitus interstitial with end of the cell.

Length 15 mm.

From Great Falls, Md., 12 July, Falls Church, Va., Sept. and Oct., and Waldoboro, Me.

Has a narrower face than *Ps. relativus*, and more angulate pronotum.

Pompiloides mæstus, new species.

Female.—Deep dull black, not silvery sericeous; clypeus truncate in front, rather brown pubescent, not hairy but with the four bristles large and erect, antennæ rather slender, third joint much longer than the first, the first not hairy, a groove to the anterior ocellus, this about twice its diameter from the rather smaller laterals, these plainly nearer to eyes than to each other, vertex straight across, head above antennæ with some long hair, the inner orbits slightly, evenly concave; pronotum quite long, angulate behind; metanotum short evenly rounded, with a median furrow, and a faint pit each side behind, abdomen rather broad at base, depressed on basal part, compressed near tip, hairy at tip, and a row of hairs on each ventral segment; anterior tarsus with the spines short and straight, but little longer than the width of joint, not forming a comb; long spur of hind tibia more than one-half of metatarsus; last joint of hind tarsus with spines beneath; legs with moderate spines, those on hind metatarsi rather longer than width of joint. Wings fuscous, much darker on tips, the hind pair plainly pale on basal half, marginal cell short, second submarginal as broad as long, third subtriangular or slightly petiolate, receiving the second recurrent beyond the middle, and this vein arising before the middle of anal cell, transverse median vein beyond the basal; in hind wings the cubitus is interstitial with end of cell.

Expanse 13 to 20 mm.

From Fedor, Lee Co., Texas (Birkmann).

Pompiloides rufibasis, new species.

Female.—Black, first and second abdominal segments partly red. Clypeus broad, truncate below, no bristles visible; antennæ short, no hairs on basal joint, third joint scarcely longer than the first, no line to anterior ocellus, this about two diameters from the laterals, and these nearer to each other than to the eyes; vertex rounded, slightly hairy, but face only pubescent; pronotum scarcely arcuate, nearly transverse behind; metanotum short, rounded, sericeous, with distinct median line; abdomen moderately broad, apical part of first segment and basal half of the second red, hardly as much below, apical segment hairy below; legs slender, well spined, tarsal comb with spines longer than width of joint, long spur of hind tibia hardly two-thirds of the metatarsus. Fore-wings black, hind-wings dusky; second submarginal cell square, third as large, but little narrowed above, first recurrent beyond middle of second marginal cell, second recurrent arising from middle of anal cell, meeting third submarginal at middle; basal veins scarcely interstitial.

Length 6 mm.

From Ithaca, N. Y., early July.

Pompiloides insolens, new species.

Male.—Black; clypeus and face each side by eyes silvery, metanotum sericeous. Clypeus broad, truncate below, bristles not distinct; antennæ short, basal joint without hair, a line to anterior ocellus, this scarcely more than

diameter from the laterals, and these closer to eyes than to each other; vertex straight, face rather long, short-haired; pronotum angulate behind; metanotum long, with distinct median groove; abdomen depressed, elongate, last segment rather broad at tip, no brushes of hair on venter; legs very slender, weakly spined, long spur of hind tibia nearly three fourths of metatarsus; wings rather pale, but black beyond cells, second submarginal with oblique sides, third triangular, receiving the second recurrent beyond middle, this vein very oblique, and arising before middle of anal cell.

Length 8 mm.

From Black Mt., N. Car., May; Chain Bridge, and Great Falls, Va., June.

Larger than *P. cylindricus*, with distinct groove on metanotum, and larger ocelli.

***Pompiloides minor*, new species.**

Female.—Deep black, clypeus slightly silvery. Clypeus broad, truncate below, bristles very weak or absent; antennæ short, no hairs on basal joint, third joint very short, not longer than first, not one half the width of vertex, no distinct line to anterior ocellus, this fully twice its diameter from the laterals, these as far from eyes as from each other; vertex slightly convex; head hairy; pronotum arcuate behind; metanotum short and broad, no distinct median line; abdomen shining above, last segment hairy; legs moderately spined, spines of tarsal comb one and one half the width of joint, long spur of hind tibia two thirds of metatarsus; wings uniformly black, second submarginal square, third triangular, receiving the second recurrent beyond middle, this vein arising from about middle of anal cell.

Length 6 mm.

From Falls Church, Va., 2 Aug., and Southern Pines, N. Car., 8 July (Manee). Distinct from the female of *P. cylindricus* by the very short third joint of antennæ.

***Pompiloides parvulus*, new species.**

Female.—Black; only slightly silvery on the clypeus and metanotum; mandibles reddish in the middle; wings black, usually darker on tip than elsewhere. Antennæ rather short, but slender, the third joint fully three times as long as broad, and a little longer than the fourth joint; a line up to anterior ocellus, this a little more than diameter from the equal hind ocelli, the latter nearly as close to each other as to the eyes; face about as broad above as below, vertex slightly convex; pronotum distinctly angulate behind, metanotum sloping, with a median furrow; abdomen not much longer than thorax, cylindrical, hairy near tip; legs distinctly spined, but spines on the hind tibia are not as long as width of the joint; long spur of hind tibia reaching a little beyond middle of the metatarsus; tarsus I with usual comb of short spines. Wings with second and third submarginal cells subequal (or even third smaller), both subtriangular; marginal cell short, oblique at tip; first recurrent meets

second submarginal near tip, second recurrent arises scarcely its length out on anal cell and curves up, meeting third submarginal before the middle.

Male.—Similar; more slender, heavier antennæ, and long spur of hind tibia is about three fourths the length of metatarsus.

Length 4.5 to 6 mm.

From Boulder and Florissant, Colo., in April, May, June and July (Rohwer); type in National Museum, cotype in coll. Banks.

Pompiloides consimilis, new species.

Perhaps but a variety of *P. parvulus*; is rather larger, has stouter antennæ, the third joint not three times as long as broad, the pronotum less distinctly angulate behind; the abdomen a little longer; the venation similar, but the second recurrent vein arises much more than its length out on the anal cell, so that the cell before it is much longer than in *P. parvulus*.

From Florissant, Colo., June and July (Rohwer); type in National Museum, cotype in coll. Banks.

Sericopompilus plutonis, new species.

Male.—Dull black, rather brown pubescent in part; clypeus brown pubescent, slightly concave in front, no bristles nor hair; antennæ long and slender, third joint much longer than the first, latter without hair; very distinct groove to front ocellus, latter one and one half diameter from equal laterals, latter plainly nearer to eyes than to each other, vertex straight across, inner orbits distinctly concave above, straight beneath, face just above antennæ and the vertex with few erect hairs; pronotum angulate behind, metanotum rather long, nearly flat above, evenly rounded behind, no distinct median groove; abdomen depressed throughout, ventral segments with preapical row of hairs, legs long, tarsi long and slender, long spine on hind tarsi nearly two thirds as long as the metatarsus, spines on metatarsus not as long as width of that joint. Wings (both pairs) black, not darker at tips; second submarginal cell longer than broad, third narrowed above, but not triangular, receiving the second recurrent vein beyond the middle, this vein arising from middle of anal cell, the basal veins interstitial, in hind-wings the cubital arises much before the end of the cell.

Expanse 18 mm.

From Fedor, Lee Co., Texas (Birkmann).

TABLE OF SERICOPOMPIUS.

1. Wings all black; no white mark on hind tibiæ, body wholly black...*plutonis*.
Wings black only at tip, or near there.....2
2. Hind tibiæ white at base above.....4
Hind tibiæ not white at base above.....3
3. Long spur of hind tibiæ three fourths of metatarsus; no white at tip of
abdomen*birkmanni*.

- Long spur of hind tibiæ not three fourths of metatarsus; white at tip of abdomen *biedermanni*.
4. Middle and hind tarsi marked with white, wings black at tips only.....5
Middle and hind tarsi all black, no red on abdomen, wings dark below stigma, and also near tip..... *humilis*.
5. Basal joint of middle and hind tarsi mostly white; no red on abdomen. *posticatus*.
Basal joint of middle and hind tarsi black; red on second segment of abdomen *cinctipes*.

Episyron atrytone, new species.

Female.—Black, clypeus densely hairy, slightly rounded below, the margin smooth; antennæ with basal joint hairy; third joint about twice the length of first, second plus third longer than vertex width; no groove to anterior ocellus, this a little more than diameter from laterals, these nearer to eyes than to each other, vertex rounded, head very hairy; pronotum angulate behind, with appressed pubescence and long hair; metanotum rather flat, densely scaly pubescent behind, and hairy all over; basal joint of abdomen with appressed scaly pubescence and long hair, last segment hairy; legs strongly spined, comb of tarsus with spines extremely long, those on second and third tarsal joints longer than joint itself; long spur on hind tibia over two thirds of metatarsus, the spines on metatarsus much longer than the width of the joint, spines below last joint of hind tarsi, claws nearly cleft, with a long sloping tooth. Wings dusky, but black at tip; second submarginal one and one half times as long as broad, receiving the first recurrent vein beyond the middle, third submarginal as broad as long, narrowed above, the second recurrent arising beyond middle of anal cell and meeting the third submarginal at middle, the marginal cell acute, not much more than its length from tip of the wing, basal vein interstitial with the transverse; in hind wings the cubitus arises before end of the cell.

Length 12 to 15 mm.

From Fedor, Lee Co., Texas, April (Birkmann).

TABLE OF EPISYRON.

- | | |
|---|--------------------|
| 1. Hind legs partly reddish..... | 2 |
| Hind legs mostly black, not at all red..... | 3 |
| 2. A transverse white spot at tip of the mesonotum..... | <i>porus</i> . |
| No such spot | <i>posterus</i> . |
| 3. Hind tibiæ with white spot at base..... | 4 |
| No such spot | 7 |
| 4. Spurs white, body partly sericeous, wings black only at tips, sometimes white spots on third segment of abdomen..... | <i>snowi</i> . |
| Spurs black | 5 |
| 5. An apical white spot on abdomen, as well as others, wings pale except tip | <i>5-notatus</i> . |
| No apical white spot..... | 6 |

6. Wings blackish all over, third segment with a pair of white spots; larger species *biguttatus*.
Wings black at tip only; no white spots on abdomen; small species, *californicus*.
7. Second and third joint of antennæ as long as vertex width; head long-haired *atrytone*.
Second and third joint of antennæ not as long as vertex width; head short haired; clypeus and basal joint of antennæ scarcely hairy *maneei*.

Aporinellus rufus, new species.

Female.—Reddish throughout, except black head, and the antennæ beyond the second joint; clypeus reddish; wings blackish at tip. Face below, posterior margin of pronotum, and the first three abdominal segments at tip more or less distinctly silvery. Antennæ rather short, third joint scarcely, if any, longer than the fourth; clypeus truncate at tip; posterior ocelli a little nearer to the eyes than to each other; longer spur of hind tibia two thirds as long as the metatarsus; second submarginal cell of fore-wing scarcely any longer than broad.

Length 5 to 6 mm.

From Boulder, 30 May, 1 June, and Florissant, 19 June, Colorado (Rohwer coll.); type in National Museum, cotype in coll. Banks.

Aporinellus laticeps, new species.

Female.—Colored as *A. fasciatus*, the segments of abdomen fasciate with silvery pubescence; fore-wings blackish at tips, fumose elsewhere; mandibles reddish near tips. Clypeus truncate in front; antennæ rather short, but the third joint is a little longer than the fourth, face plainly broader above than below; ocelli small and wide apart, the anterior ocellus fully three times its diameter from the lateral ocelli, and these are nearer to the eyes than to each other, longer spur on hind tibia fully two thirds of the metatarsus; second submarginal cell fully twice as long as broad, the second recurrent vein plainly before tip of cell.

Length 8 mm.

Similar to *A. fasciatus*, but the noticeably wider vertex, and much broader ocellar triangle distinguishes it.

From Boulder, Colo., Sept. (Rohwer): type in National Museum, cotype in coll. Banks.

TABLE OF APORINELLUS.

- | | |
|--|------------------------|
| 1. Thorax and abdomen reddish, head and most of antennæ black..... | <i>rufus</i> . |
| Thorax and abdomen black | 2 |
| 2. Most of hind legs reddish..... | <i>ferrugineipes</i> . |
| All legs black | 3 |
| 3. Body not much sericeous, fourth segment of abdomen hardly sericeous at tip; wings nearly uniform blackish | <i>apicatus</i> . |

- Body strongly sericeous, fourth segment of abdomen broadly sericeous....4
 4. Vertex broader than face below.....*laticeps*.
 Vertex narrower than face below.....*fasciatus*.

Pedinaspis.

Pronotum long, flat, barely arched; with three submarginal cells, second and third each receiving a recurrent vein; basal veins interstitial with the transverse, in hind-wings the cubitus always arises beyond the end of the cell; coxæ I not reaching to coxæ II; no spines under last joint of hind tarsi.

It would probably be better to include in *Pedinaspis* those species of *Planiceps* in which the second submarginal cell receives but one recurrent vein, thus restricting *Planiceps* to those species in which this cell receives both recurrent veins.

P. lævifrons on account of having the ocelli placed so low on the face may form a new subgenus; it also has the transverse vein in fore-wings sloping backward.

Psorthaspis n. subgen.—type, *Parapompilus lævifrons* Cress.

TABLE OF PEDINASPIS.

- | | |
|---|---------------------|
| 1. Wings banded | 2 |
| Wings not banded | 4 |
| 2. First segment of abdomen black, second black with two yellowish spots, and third with basal pale band..... | <i>luctuosus</i> . |
| First and second segments mostly yellowish..... | 3 |
| 3. Tip of abdomen pale | <i>legatus</i> . |
| Tip of abdomen black..... | <i>maria</i> . |
| 4. Abdomen wholly black..... | 5 |
| Abdomen more or less reddish..... | 9 |
| 5. Wings wholly pale, apical part of abdomen with short, dense white hair | <i>magnus</i> . |
| Wings more or less black..... | 6 |
| 6. Metanotum transversely wrinkled behind; abdomen purplish..... | <i>planatus</i> . |
| Metanotum not wrinkled | 7 |
| 7. Wings deep black; metanotum not much excavate behind, and not pubescent | 8 |
| Wings less black; metanotum strongly excavate behind, and white pubescent | <i>australis</i> . |
| 8. Head smooth; anterior ocellus about as near to antennæ as to vertex ridge | <i>lævifrons</i> . |
| Head roughened with lines, ocelli about as high as usual..... | <i>vicinus</i> . |
| 9. Thorax reddish | <i>sanguineus</i> . |
| Thorax blackish | <i>texanus</i> . |

***Pseudagenia cœrulescens* Dahlb.**

Female.—Head and thorax bluish black, clothed with silvery pubescence; clypeus mostly pale yellowish, but upper part dark, rather strongly rounded out on the lower margin; antennæ pale reddish brown, second joint darker, third joint a little longer than first, a faint line from antennæ to anterior ocellus, latter scarcely more than diameter from the laterals, these a little nearer to each other than to the eyes, vertex slightly rounded, front and vertex with rather long hair; pronotum arcuate behind; metanotum rather short, evenly rounded, no impressed median line, posterior sides heavily white pubescent, dorsum clothed with fine white erect hair; coxæ bluish, femora reddish, rest of legs brownish or nearly black, spurs brown, long one on hind tibia one half the length of metatarsus; abdomen dull black, hairy at tip, last segment with elongate, basally rounded, shining pygidial area. Wings nearly hyaline, scarcely smoky, not darker at tip, third submarginal cell longer than the second, and broad at tip, receiving the second recurrent before the middle, this vein arising very much beyond the middle of anal cell, basal veins interstitial; in hind wings the cubital arises beyond the cell.

Length 8.5 mm.

Fedor, Lee Co., Texas (Birkmann).

A male, which appears to belong here, has the face below antennæ pale yellow, except a median dark spot on clypeus; the antennæ are dark above and paler beneath, anterior legs are all pale yellowish brown, mid legs all except coxæ, but rather darker on tarsi, the hind femora pale, the long spur reaching beyond middle of metatarsus.

***Pseudagenia feroculis*, new species.**

Male.—Black throughout. Clypeus broad, truncate below, margin elevated; antennæ moderately stout, no line to anterior ocellus, this scarcely more than diameter from laterals, these as near eyes as to each other; vertex rounded, head very broad; pronotum arcuate behind; metanotum short, broad, rounded, finely punctate, with a median groove; abdomen dull black, quite long, apical segment broad, long-haired below; head, thorax, abdomen and coxæ densely black-haired, also some on the femora, long spur of the hind tibia scarcely one half of metatarsus. Both pairs of wings deep black, second submarginal square, receiving the first recurrent near the middle; third submarginal much longer than second, the second recurrent vein arising at outer third of anal cell, meeting the third submarginal before middle, the basal vein rounded at base, and before the transverse vein; in hind wing the cubitus is interstitial with end of cell.

Length 13 mm.

From Coryell Co., Texas, May (Birkmann).

***Pseudagenia nigrella*, new species.**

Female.—Black; clypeus and lower part of face, and the metanotum with white pubescence, and white hair. Abdomen shining, apical segment hairy.

Clypeus rounded below; second plus third joint of the antennæ scarcely more than two thirds of the vertex width; no line to anterior ocellus, this over diameter from the laterals, these much nearer to each other than to the eyes; vertex slightly rounded; pronotum angulate behind; metanotum sloping, no median groove; legs slender, long spur of hind tibia almost one half of metatarsus; wings nearly hyaline, hardly darker at tips; second submarginal longer than broad, receiving the first recurrent at middle; third submarginal longer than second, wide at tip, narrowed above, receiving the second recurrent before middle, this vein arising beyond middle of anal cell; basal vein a little before the transverse; in hind-wings the cubitus arises beyond end of the cell.

Length 6 to 7 mm.

From Great Falls, Va., 18 June, and Black Mountain, N. Car., May.

***Pseudagenia mexicana* var. *flavicoxa*, new var.**

Differs from typical *mexicana* in having the coxæ and antennæ yellowish, only last joint of tarsi brown; tegulæ yellowish. The long spur of hind tibia is a little longer than in the typical form.

Palmerlee, Arizona, June.

***Pseudagenia mellipes* var. *adjuncta*, new var.**

Like *mellipes*, but with the coxæ also yellow.

From Texas and Virginia.

***Pseudagenia mellipes* var. *interior*, new var.**

Like *mellipes*, but the hind tibiæ have a black line on inner side, and the antennæ are yellowish.

From Southern Pines, N. Car.

***Ageniella annecta*, new species.**

Female.—Similar in size and structure to *A. blaisdelli*, but color entirely black. Clypeus rounded below, with bristles and hair; no hair on basal joint of antennæ, third joint very long, second plus third fully as long as vertex width, line not reaching anterior ocellus, this its diameter from the rather smaller laterals, these nearer to eyes than to each other, vertex scarcely rounded; pronotum angulate behind; metanotum long, sloping, sericeous, not hairy, no median groove; abdomen with last two segments above and three below quite hairy; legs long, the tibiæ distinctly spined; long spur of hind tibiæ not one half of the metatarsus. Wings blackish, third submarginal cell much longer than broad, receiving the first recurrent toward tip, third submarginal as long as second, narrowed above, receiving the second recurrent before middle; this vein arising from outer third of anal cell; basal veins rounded at base, much before the transverse; in the hind-wings the cubitus arises beyond the end of the cell.

Length 12 mm.

From Falls Church, Va., 14 June, on *Ceanothus*.

TABLE OF AGENIELLA.

1. White marks on the pronotum; legs pale, spurs white.....*calcarata*.
No white marks on pronotum.....2
2. Body all reddish3
Body not all reddish4
3. Wings pale, banded with dark.....*accepta*.
Wings all dark*blaisdelli*.
4. Abdomen with more or less red; spurs white.....5
No red on abdomen8
5. Hind legs mostly yellowish6
Hind legs black7
6. Abdomen all reddish; antennæ all black; wings smoky.
(*rufigaster*)=*congrua*.
Abdomen black on last few segments; basal joint of antennæ yellowish;
wings hyaline, with black tip*apicipennis*.
7. Tibiæ and tarsi I yellowish; third cell short, angular on middle
behind*perfecta*.
Tibiæ and tarsi I black; third cell long, outer side oblique.....*birkmanni*.
8. Hind legs mostly yellowish.....9
Hind legs black10
9. Third cell short, outer side rounded; spurs yellowish.....*externa*.
Third cell long, outer side oblique; spurs brown.....*texana*.
10. Spurs whitish11
Spurs blackish12
11. Basal vein very much before the transverse; anterior tarsi pale.*iridipennis*.
Basal vein nearly interstitial with the transverse; anterior tarsi black.
virginica.
12. Third cell shorter than broad, outer side rounded, very small species....13
Third cell longer than broad.....14
13. All tarsi pale, except last joint; wings faintly marked in middle....*brevis*.
Tarsi black; wings uniformly blackish.....*atrata*.
14. Basal vein interstitial with transverse; third cell not very long; ♂ abdomen
petiolate15
Basal vein much before transverse; second and third cells very long;
wings black; large species.....16
15. Wings pale, tip dark; tibiæ I yellowish.....*petiolata*.
Wings dark, darker on tip; tibiæ I scarcely yellowish.....*cuphorbia?*
16. Bluish species; abdomen shining*cupida*.
Black species; abdomen dull*annecta*.

Cryptocheilus incitus, new species.

Female.—Black, body silvery sericeous. Clypeus hairy, truncate in front; antennæ slender, basal joint without hair, third very much longer than first, line above does not reach anterior ocellus, this is nearly twice its diameter from the laterals, and these full as near eyes as to each other; vertex slightly rounded, with a few long, erect hairs; pronotum angulate behind; mesonotum

with a few erect hairs; metanotum long, sloping, sericeous, median line scarcely distinct; abdomen long, sericeous, apical segments very hairy, a few hairs on preceding segment; legs very slender, hind tibiæ serrate, but with very short spines, the long spur of hind tibia scarcely one half of the metanotum. Wings nearly hyaline, fore-wings dark around tip, second submarginal fully one and one half times as long as broad, first recurrent received beyond the middle, third submarginal still longer, narrowed above, second recurrent arising beyond middle of anal cell, slightly sinuate to middle of third submarginal; marginal cell acute at tip; basal vein rounded at base, and before the transverse vein.

Length 16 mm.

From Fedor, Lee Co., Texas, 2 June (Birkmann).

TABLE OF CRYPTOCEILUS.

1. Antennæ yellowish, in part at least.....2
Antennæ black4
2. Wings dark, body ferruginous*nuperus*.
Wings hyaline3
3. Wing with three dark bands; thorax pale.....*facetus*.
Wing with apical band only, thorax black.....*placitus*.
4. Thorax reddish, also the abdomen.....5
Thorax black6
5. Head black; legs pale, small.....*scitula*.
Head reddish; legs black, larger.....*nigripes*.
6. Abdomen reddish above and below.....7
Abdomen not reddish below, sometimes above on basal segments.....10
7. Hind legs reddish, wings pale, with a dark cloud.....*alienatus*.
Hind legs black, no cloud in wing, or wings all dark.....8
8. Coxæ very hairy; western species.....*comparatus*.
Coxæ sericeous, barely hairy9
9. Abdomen sericeous; third cell longer than broad; abdomen elongate.
arcuatus.
Abdomen shining; third cell broader than long; abdomen shorter..*nothus*.
10. Abdomen with red on basal segments above.....11
Abdomen all black.....12
11. First segment of abdomen dark at tip; coxæ and femora hairy....*validus*.
First segment of abdomen all reddish.....*paneparcus*.
12. Face with dense golden hair; spurs white; pronotum shining...*fulgifrons*.
Face with silvery hair, or black.....13
13. Metanotum wrinkled behind; wings deep black; third cell much longer than broad14
Metanotum not wrinkled behind15
14. Pronotum barely angulate; marginal cell acute at tip; antennæ rather short; coxæ very hairy*fortis*.
Pronotum plainly angulate behind; marginal cell rounded at tip; antennæ very slender; middle and hind coxæ but little hairy.....*subopacus*.

15. Third cell much longer than broad, hind tibiæ only moderately serrate...16
 Third cell as broad as long, or else the hind tibiæ very strongly serrate...17
16. Metanotum with black hair, not silvery sericeous; wings nearly black; basal vein of fore-wings at lower end not rounded out.....*nebulosus*.
 Metanotum with short, white hair, silvery sericeous; wings pale; basal vein rounded out at base; hind tibiæ very weakly serrate.....*incitus*.
17. Wings uniform black; clypeus truncate, basal vein rounded out at lower end; coxæ scarcely hairy.....*pompilus*.
 Wings not a uniform black.....18
18. Clypeus convex on front edge; no distinct cloud in wings, third cell quite long*agenoides*.
 Clypeus truncate in front.....19
19. Tibia not strongly serrate near tip; a distinct stigmal cloud in wing, coxæ scarcely hairy.....*germanus*.
 Tibia strongly serrate to tip; stigmal cloud indistinct or absent; coxæ very hairy*conicus*.

***Priocnemoides pallidipennis*, new species.**

Dull black; head broad; clypeus rounded below; first and second joint of antennæ black, rest yellowish; third joint much longer than the first; a line to the anterior ocellus, this fully two diameters from the laterals, and these much nearer to each other than to eyes; vertex nearly straight across; pronotum angulate behind; metanotum long and with a median groove, transversely wrinkled behind; abdomen hairy at tip, and a few hairs on venter; legs brownish toward tips; long spur on hind tibiæ scarcely more than one fourth of the metatarsus. Wings pale yellowish, darker on tips; second submarginal cell a little longer than broad, receiving the first recurrent vein beyond the middle; third submarginal longer than second, a little narrowed above, receiving the second recurrent beyond middle, this vein arising from a little beyond middle of anal cell, only a little curved; marginal cell rounded at tip. In hind-wings the cubitus arises beyond end of the cell.

Length 12.5 mm.

From Tucson, Arizona (Snow).

TABLE OF PRIOCNEMOIDES.

1. Antennæ mostly yellow2
 Antennæ black6
2. Wings mostly black3
 Wings mostly reddish or yellowish; metanotum hairy, transversely striate5
3. Metanotum transversely striate, and hairy; wings pale before tip.
unifasciatus.
 Metanotum hardly striate, and scarcely hairy; wings all black.....4
4. Third ventral segment with a pair of humps beneath.....*fulvicornis*.
 Third ventral segment without humps.....*magnus*.

5. Wings rather reddish; in hind-wing the cubitus arises before the end of cell; second recurrent vein of fore-wings strongly bent... *flammapennis*.
Wings more yellowish; in hind-wing the cubitus arises beyond the end of cell; second recurrent vein of fore-wings but little curved... *pallidipennis*.
6. Metanotum transversely striate, and hairy.....7
Metanotum not striate8
7. Wings reddish yellow, except tip; femora I with long hair beneath.
mexicanus.
Wings mostly black, with a yellow spot..... *maculipennis*.
8. Wings mostly reddish or yellowish.....9
Wings all black; no hair on metanotum..... *idoneus*.
9. Marginal cell acute at tip; metanotum and scutellum with erect hair.
texasus.
Marginal cell rounded at tip.....10
10. Metanotum without erect hair..... *terminatus*.
Metanotum with erect hair..... *heiligbrodti*.

Pepsis.

In this genus of magnificent insects the names have become much confused; I offer only a few preliminary notes.

P. nephele: this can be recognized by the long hair beneath femora I, as well as by broadly margined wings. *P. circularis* is, I believe, the male, or else male of some closely allied species of which the female is unknown.

P. inermis: this has a fine distinguishing character in the hairs with curved tips situate in the spiny area of the hind tibiæ.

The *P. chrysothemis* and *P. pyramis* of the Fox collection are (I consider) the sexes of one species; I have it also from California, both sexes at same locality.

P. venusta Smith: I have a specimen of this, not hitherto recorded north of Mexico, from Palmerlee, Arizona, the white of tip of wings extends to the middle of the marginal cell.

A CONTRIBUTION TOWARD THE LIFE HISTORY OF EMPHOR BOMBIFORMIS CRESS.

BY JOHN A. GROSSBECK,

AMERICAN MUSEUM OF NATURAL HISTORY, NEW YORK CITY.

(WITH PLATE VII.)

Emphor bombiformis Cress.¹ is one of the larger digger bees and is allied to the species of the genus *Melissodes*. It is not ordinarily regarded as common; but is not rare at Arlington, New Jersey, where, in the vicinity of its nesting region, one or two hundred specimens could easily be taken in the course of a day at the proper season. The writer first met with the species in 1909 when several colonies were found at the edge of a cat-tail marsh. In 1910 other colonies were discovered in the same general region. The species seems to prefer hard, shaly soil in which to nest though small colonies occur in sandier soil.

On August 30, 1909, one large colony, comprising perhaps seventy bees, was discovered, which had made one hundred and twenty-seven holes on an area three feet in diameter. Two smaller colonies, one seventy feet and the other twelve feet away from this large one, consisted of about eight and twelve individuals respectively, and a still smaller number of bees constituted a fourth colony between the nearest of these two larger colonies and the very large one.

When first the bees were approached there was great commotion among them; they flew wildly about and buzzed loudly and were so reluctant to enter their burrows that soon the dozen or so at first present was increased to a swarm of about thirty. Quiet ensued in about five minutes. Later in the day my presence was not in the least disturbing to their peace, though usually I remained two feet or more away from the nesting region so as not to interfere with their natural behavior.

Until well into the noon hour their actions were quite inexplicable. Some were constantly leaving the nests and some were returning, the former always empty-handed. Usually on returning they would

¹ Determination made by Henry L. Viereck, Washington, D. C.

immediately enter one of the holes, sometimes after describing a few small circles over the entrance, remain there for a short time, and leave again. Others would rest lazily at the entrance of their burrows, with head and fore part of thorax out, and retire only to reappear in a few moments or fly away. A few others, after a great deal of buzzing, would walk over the pellets rejected in the construction of the holes as if in search of something, but would finally fly away without having accomplished anything. Still others walked about aimlessly or were extremely busy peering into or examining the burrows of their neighbors, entering first one, then another, but remaining in them only for a few moments at most. Occasionally, after entering a burrow, one would back out hurriedly as if pursued, though I saw no pursuer; at other times one would be met at the entrance by what was presumably the rightful occupant and owner of the nest, who really appeared to look savage, and in such cases the intruder made haste to move on.

One individual actually entered sixteen holes before finally flying off. The burrow of this bee, it appeared, had been damaged, as several times the bee returned to a broken nest, removed part of the débris and then went off investigating again.

In beginning a burrow the bee with its fore legs digs furiously in the thin layer of sod material, brushing the fragments away with its hind legs and meanwhile turning around constantly and standing almost on its head as it were. When the hole has attained a depth of half an inch, soil is reached, and then a different method of working is begun. The soil is now moistened with saliva, small pieces are then bitten off with the mandibles and passed upward to the hind legs where with the assistance of the abdomen it is placed at the entrance of the hole. As pellet after pellet is placed in position the bee turns round and round making one circuit in about one minute and a half, and, with the abdomen partly bent under on the venter and moving from side to side, smooths down the interior of the growing turret. During this process the bee now and then emerges from the burrow and standing clumsily over the half completed turret cleans its antennæ with its fore legs, and the hind legs with each other. When the turret has reached a height equal to one-half inch, building ceases, but the work of excavation goes on and the pellets, now larger, are brought to the top of the turret, with the hind legs as usual, and

forcibly ejected over the rim. Sometimes the pellets are thrown to a distance of only half an inch, but usually one or two inches or, in rare instances, four inches. Occasionally a pellet is thrown into the burrow of another bee and if the latter is also digging the pellet is simply removed like the others by being brought to the surface with the hind legs. Frequently, however, the mouth is used and the pellet tossed over the top of the turret.

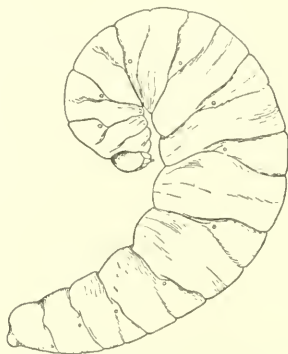


FIG. 1. Larva of *Emphor bombiformis* Cress.

The burrows when completed are somewhat more than one fourth inch wide and of varying depth, two and one half inches being about the average depth though some are four inches deep and others less than one inch. At the bottom the burrow is widened into a cell.

Not infrequently the bee encounters difficulties in commencing a burrow. In the center of the colony where the holes are most numerous the pellets are littered over the ground to such an extent that frequently only the rim of the highest turret is visible. Instead of extending the colony by working at its outer borders a bee occasionally digs among these pellets and, as fast as the dry pellets are pushed aside, others roll into the forming hole, and it is only after great exertion that a good beginning is effected: sometimes the project is abandoned in these places and a new hole started somewhere else.

At one time a bee was observed repairing a turret which was slightly broken and partly covered over with pellets. On first returning, the nest was not positively identified by the bee; it made a

hasty survey of the wreck, flew away in a zig-zag manner, rapidly examining other nests in the vicinity and returned to the broken one. This was repeated several times. Twice during these performances it engaged in momentary combat with another bee as though the latter were in some way responsible for the destruction of the nest. Finally it began to clear away the wreckage in mad haste, and when this had been done, peered into the hole and walked leisurely in. A little later it brought bits of mud from below in its mandibles and began mending the broken turret.

When the cell is completed it is provisioned with pollen, and it is a noticeable fact that pollen laden bees locate their burrows immediately. There was no uncertainty displayed as in the morning hours, when no pollen was gathered and no preliminary buzzing or circling about; but one direct flight to the entrance of the burrow where the bee plunged in and disappeared instantly.

The first bee that arrived with pollen, it is true, buzzed around in large circles before entering; but that was undoubtedly because of my close proximity to the nest at the time.

The bright yellow pollen is gathered from the swamp rose mallow (*Hibiscus moschatus*) and carried in surprisingly large flocculent masses on the hind legs. Rarely small flakes are dropped in flight or brushed off at the entrance of the nest, but this is unusual for as a rule the little worker knows how to manage her load.

Despite the large size of the individual loads of pollen carried, quite a number of trips are made before sufficient material is collected to form the solid pollen ball into which the masses are finally shaped. One bee provisioned its burrow in exactly thirty six minutes after she arrived with the first load—an average, allowing three minutes for the gathering of load number one—of about four minutes to the load. Rarely did she stay more than one minute in the nest. When the tenth load had been deposited she flew away and did not return until ten minutes had passed; then after a momentary examination of the interior of the nest departed again and returned after fifteen minutes. Finally she flew away again and I saw no more of her.

Into one burrow three loads of pollen were taken at about one minute intervals. This bee, it appeared, was exceptionally industrious and attention was centered on this one burrow. Soon a fourth load

was taken in and as the carrier left, another bee, also laden with pollen, entered. Again the first bee came, and as she was in the hole number two arrived and entered also. Both came out hurriedly, one obviously in pursuit of the other; around and around they buzzed, finally clenched, rolled over on the ground, separated, and then both departed. Presently, however, one returned, undoubtedly the owner of the nest, and rapidly removed three tremendous loads of pollen from the burrow, two of which were dropped intentionally or unintentionally a short distance from the entrance, and the third of which was carried away.



FIG. 2. Pupa of *Emphor bombiformis* Cress.

Digging into several of the burrows, pollen in the same loose condition as when first carried in was found in some, and in others the ready-formed three-eighth-inch pollen ball. This ball was less than one fourth the size of the pollen mass used to form it. To one a single slender, elongated, curved egg was attached and on another a small larva was feeding. The burrows, it appears, are not covered up after the egg is laid, as this egg and larva were dug from open burrows; and besides I saw nothing that looked like a covered burrow.

Twice during the afternoon spent in watching the bees a little wasp, which Mr. Viereck determines as *Lyroda subita* Say, alighted among the nests and, nervously walking about, entered one burrow after the other, occasionally remaining in one for the greater part of a minute. By its peculiar actions I supposed it to be parasitic on

the larva of the bee, or an inquiline in its nest; but the life history of this wasp as given by the Peckhams is so entirely different, that one simply wonders what it was doing among the nests of *bombiformis*.

In the following year, March 26, 1910, the first trip of the series I proposed to take to the camping ground of the bees was made, and about one square foot of soil was dug over and carefully examined. Old cocoons, most of them filled with earth and as hard as the packed shale imbedding them, were obtained in great numbers, no less than one hundred and sixty being found in the square foot of earth examined. These undoubtedly represented the empty cocoons of years' accumulation. Apart from this number of old cocoons, six new ones were found, and these, unlike the others, were of an ochre color, in appearance much like the original pollen ball stored by the bee but larger, and they rolled out of their cells as they were freed from earth on one side. Of the six cocoons five contained large white larvæ with the head and thorax bent under against the venter as shown in Fig. 1. Nothing was left of the pollen ball, and apparently the larva merely awaited the advent of warm weather to change to a pupa and eventually to an adult. The other cocoon contained a dead larva, shrivelled, and to some extent covered with fungus.

On April 27 a second visit to the place was made and this time the entire ground inhabited by the largest of the three colonies was dug over. Old cocoons were present by the hundred, but only twenty-one good ones were secured. Also, about thirty pollen balls, untouched in any way, were obtained. Either the adult female neglected to place her egg upon these, or the egg, in case it was deposited, failed to hatch, or the larva died at a very early stage of its existence. No indications of Meloid beetles, which it was the special object of digging up the entire area to secure, were seen.

A few of the larvæ secured on this trip were preserved, but the majority of cocoons were buried intact beneath an inch or less of loose sand with a view to rearing the adults. These were then left by themselves without as much as an occasional wetting (except that on June 10, one cocoon was opened to note the condition of the larva) and on July 11 the first bee, a male, emerged. A cocoon was immediately dug up and the pupa sketched. This presented an appearance shown in Fig. 2. Other adults, numbering six in all, emerged up till July 20, two appearing on this date, and all of them females.

On July 21 another visit to the region of the colonies was made to get males, if possible, but no bees of either sex were seen. On the 22d of August, however, the bees were out in full force, but only females were noticed. On this trip numbers of the bees were found flying over a road-side puddle on which they alighted and were blown over its surface by the wind to the opposite side. This seemed to be done for mere sport for as soon as the leeward side was reached they rose and flew to the windward side, alighting as before. Whether or not they actually lapped up water with which to moisten the soil when digging their burrows I was unable to observe, as the wind wafted them so rapidly across the small pool, but I rather suspect that this was the case.

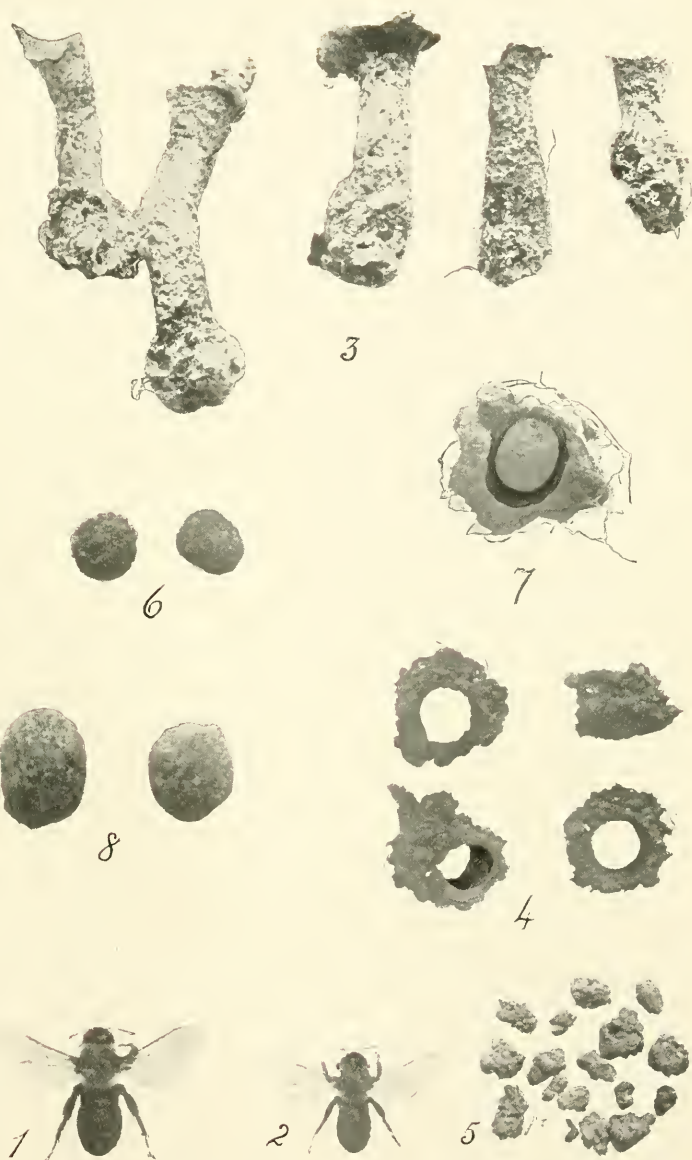
Besides the colonies located the year before no less than five others were discovered, none of them, however, so large as the principal one by the meadow. These new colonies were fully a quarter of a mile from the marsh, and two of them were in a steep embankment.

On a fifth trip, on Sept. 3, the region was visited once more, but the bees were all gone. Scarcely a turret survived the almost daily showers of the ten previous days, and irregular holes merely marked the entrances to the cells. Quite a number of the burrows were uncovered and larvæ from one fourth to nearly full grown were found coiled around the moist and slimy pollen ball which had decreased in size in proportion as the larva had increased.

Though larvæ were not rare, fully 95 per cent. were dead as the result of mould due to the continuous humid condition of the atmosphere. It will be interesting to note whether on this account the bees will be reduced in numbers in 1911.

EXPLANATION OF PLATE VII.

- Fig. 1. *Emphor bombiformis*, female.
 - Fig. 2. *Emphor bombiformis*, male.
 - Fig. 3. Plaster casts of burrows.
 - Fig. 4. Turrets from the entrances to the burrows.
 - Fig. 5. Pellets ejected in digging the burrow.
 - Fig. 6. Pollen balls.
 - Fig. 7. Pollen ball *in situ*.
 - Fig. 8. Cocoons.
- All natural size.



Emphor bombiformis Cresson.



DESCRIPTIONS OF SOME NEW FUNGUS-GROWING ANTS FROM TEXAS, WITH MR. C. G. HARTMAN'S OBSERVATIONS ON THEIR HABITS.¹

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(WITH PLATE VIII.)

During the past summer, Mr. Carl G. Hartman, of Huntsville, Texas, sent me a number of fungus-growing ants whose habits he had been carefully observing. I at first regarded the specimens as representatives of an undescribed species of the subgenus *Trachymyrmex* (genus *Atta*) but on comparing them with a large amount of material from various portions of Texas and of the United States east of the Mississippi River, I find that they represent a couple of undescribed varieties of *T. septentrionalis* MacCook. This comparison also shows that this species is far from being as uniform in its characters as has been hitherto supposed. In my paper on our fungus-growing ants¹ I did, indeed, distinguish a darker southern form of *septentrionalis* from Texas and Florida as distinct from a paler form occurring in New Jersey and the District of Columbia, and regarded the latter as the type of the species. The former was designated as var. *obscurior*. My description of the three phases of the species, however, was drawn from Texas specimens. Renewed study of the materials in my collection together with numerous specimens from several colonies received from Mr. Hartman, leads me to regard *obscurior* as a subspecies, which presents several distinct varieties. I have also found an interesting color variety of the typical *septentrionalis*. The workers and females of these different forms may be described as follows.

1. *Atta* (*Trachymyrmex*) *septentrionalis* MacCook (typical).

Worker.—Length 3–3.5 mm.

Gaster rather globose, with convex sides and faint lateral ridge on the first segment. Surface of body rather smooth, slightly shining; tubercles small and

¹ Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University, No. 50.

² The Fungus-growing Ants of North America," Bull. Amer. Mus. Nat. Hist., XXIII, 1907, pp. 669–807, 5 pls., 31 text figs.

acute; thoracic spines slender. Color brownish yellow; borders of clypeus and frontal carinae, front and vertex, a large blotch in the dorsal impression of the postpetiole and a median dorsal stripe on the first gastric segment, dark brown or blackish.

Female.—Length 4–4.5 mm.

Resembling the worker but more coarsely sculptured. Pronotum transversely, mesonotum longitudinally rugulose. Wings opaque, infuscated; at the base yellowish along the costal margin.

New Jersey: Vineland (Mrs. Mary Treat): Toms River (Morris, McCook); Lakehurst (Wheeler, W. T. Davis); Lucaston (E. Daecke), Milltown and Manasquam (Davis), Prospertown (J. B. Smith's List).

District of Columbia: Washington (Pergande, Swingle, Forel).

North Carolina: Black Mt. (Forel).

2. **A. (T.) septentrionalis var. vertebrata, new var.**

Worker.—Length 2.5–3.3 mm.

Differing from the typical form in its smaller size, coloration and sculpture. The dark spots and bands on the head, gaster and postpetiole are broader and more extensive, and the thorax is infuscated in the middorsal line. In some specimens the pleurae and venter are also brownish. The surface of the body is more opaque and the spines and tubercles are even smaller than in the typical form.

Female.—Differing from the female of the typical form in having the pronotum, mesonotum and petiole blotched with brown. Body opaque; sculpture as in the typical form.

Described from numerous workers and two deâlated females taken by myself from a single colony at Lakehurst, N. J.

3. **A. (T.) septentrionalis obscurior Wheeler.**

Worker.—Length 3–3.5 mm.

Differing from the typical form in color, sculpture, pilosity and the shape of the gaster. The body is deep ferruginous, with slightly paler legs, the front and vertex and a usually very indistinct dorsal band or spot on the gaster, brownish. There is no dark spot on the postpetiole. The body is opaque and distinctly granular. The tubercles are all larger and more prominent and the spines on that account seem to be more robust and blunter, though not longer than in the typical form. The hooked hairs covering the body and appendages are coarser though no longer than in the type. The gaster is less globose, being flatter above and with straighter, subparallel and distinctly ridged sides.

Female.—Length 3.8–4 mm.

Resembling the worker, but the sculpture is coarser. The dark spot on the head is deeper and restricted to the ocellar region; the band on the gaster is also more distinct.

Texas: Austin (type locality), Montopolis and Milano (Wheeler);

Paris (C. T. Brues, Miss A. Rucker); Denton (W. H. Long); Palestine (F. C. Bishopp); Brownswood (W. D. Pierce).

Louisiana: Ruston (W. D. Pierce).

Illinois: Elizabethtown, Hardin County (W. P. Flint).

It is this form that Buckley may have seen and designated as *Atta tardigrada*, but, as I have shown (*loco citato*, p. 708), his description is so poor that it will apply to almost any of the Texan species of *Atta*.

4. A. (T.) *septentrionalis obscurior* var. *irrorata*, new var.

Worker.—Differing from the typical *obscurior* only in having the surface of the body between the spines and tubercles covered uniformly with dense, gray granules. In size and in the development of the spines and tubercles the specimens are essentially like those of the typical form of the subspecies.

Described from many workers taken from six colonies at Huntsville, Texas, by Mr. C. G. Hartman.

5. A. (T.) *septentrionalis obscurior* var. *crystallina*, new var.

Worker.—Differing from the typical *obscurior* only in having the body covered with a layer of minute crystalline particles, probably an excretion.

The female and male resemble the corresponding phases of the typical *obscurior* in lacking this layer of particles.

Described from several hundred workers, four males and a few dozen winged females taken from five colonies at Huntsville, Texas, by Mr. C. G. Hartman.

6. A. (T.) *septentrionalis obscurior* var. *seminole*, new var.

Worker and Female.—Differing from the typical *obscurior* in their somewhat larger average size (worker 3.5–4 mm.; female 4.5–5 mm.), decidedly rougher integument and the stouter tubercles and spines. The dark brown markings on the head and gaster are more distinct and there is a spot of the same color in the dorsal impression of the postpetiole. In the female the region in front of the ocellar spot is also dark brown.

Male.—Like that of the male *obscurior* but averaging somewhat larger.

Florida: Miami (Wheeler).

Other specimens marked "Florida," collected by Pergande and received some years ago from Dr. Gustav Mayr, evidently belong to the same variety.

Further study of *T. septentrionalis* may show that the varieties *irrorata* and *crystallina*, which I have based merely on peculiar surface appearances, are inadmissible, for these appearances may be

characteristic of a purely temporary physiological condition. They may be modifications of the bluish bloom often found covering specimens of *Trachymyrmex* and *Cyphomyrmex* and apparently analogous to the waxy secretion covering the bodies of senescent dragon flies and the surface of Rynchophorous beetles of the genus *Lixus*.

Among the material collected by Mr. Hartman during September, 1911, I find a couple of workers representing the following subspecies of *T. turrifex*, a species which has been taken heretofore only in the dry central and western portions of Texas:

A. (*T.*) *turrifex* Wheeler subsp. *caroli*, new subspecies.

Worker.—Length 2.5–2.8 mm.

Differing in its smaller size from the typical *turrifex*, which measures 3–3.75 mm. and in coloration, the whole body with appendages being brownish yellow, with the front and vertex infuscated. The hooked hairs covering the body and appendages are neither coarser nor more abundant than in the typical form, but their dark brown color, contrasting with the pale integument, makes them more conspicuous. The tubercles are very small and acute, especially on the gaster. This region lacks the median longitudinal impression and lateral ridges, which though feebly developed, are nevertheless distinct in the typical form.

Described from two specimens taken from the same colony at Huntsville, Texas, by Mr. C. G. Hartman. This form evidently represents a depauperate, arenicolous race ranging considerably eastward of the typical *turrifex*.

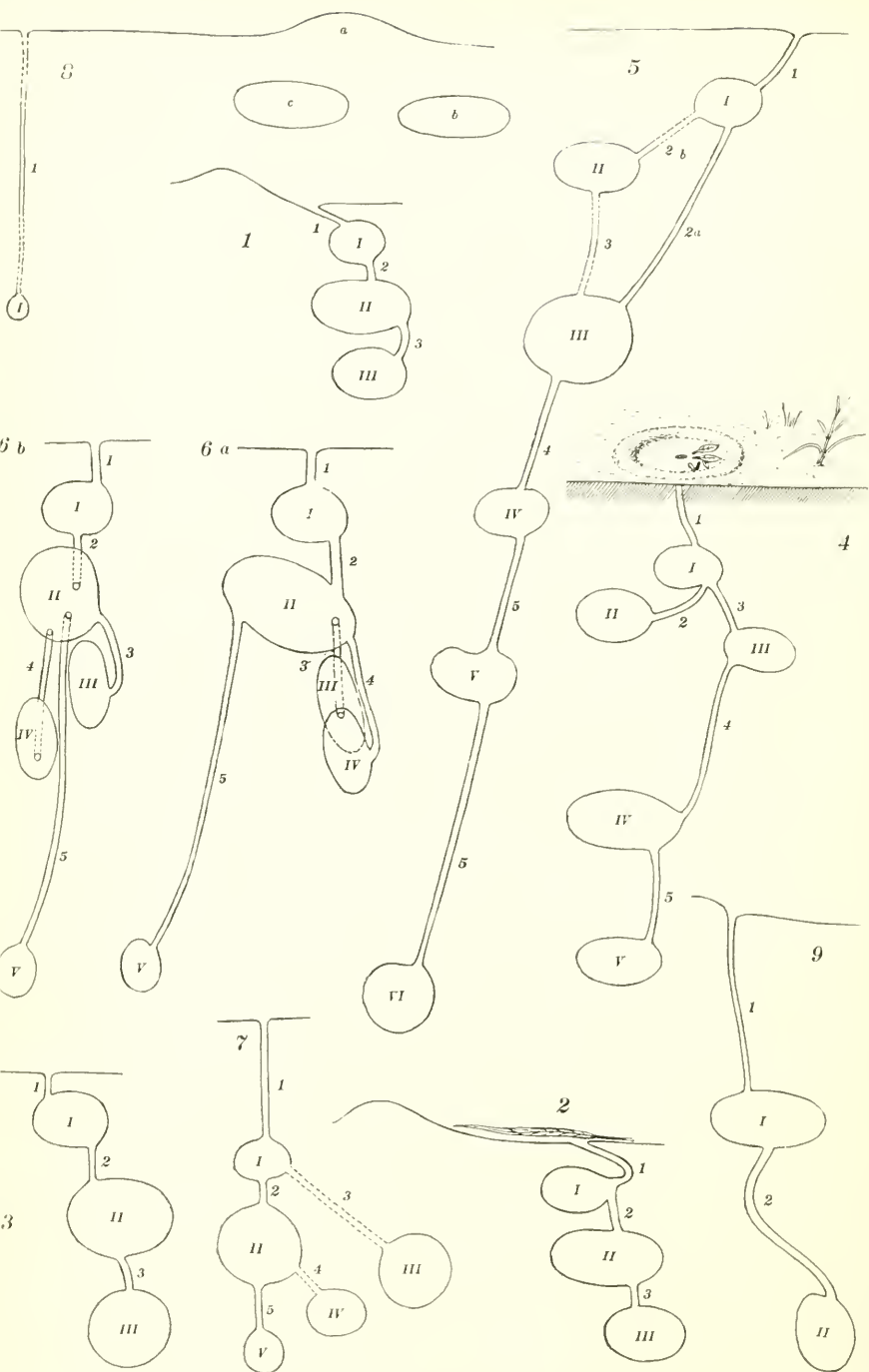
The following table will assist in distinguishing the various forms described above as well as the other known species and varieties of the subgenus *Trachymyrmex* from North, South and Central America:

- | | |
|---|------------------------|
| 1. Antennal scape furnished with a lobe at the base..... | 2 |
| Antennal scape without a lobe at the base | 3 |
| 2. Lobe of antennal scape long and narrow; posterior angles of head usually acute; surface of body scabrous, not pruinose. Length 3.25–4.5 mm. Rio Grande do Sul..... | <i>iheringi</i> Emery. |
| Lobe of antennal scape short and broad; posterior angles of head obtuse; surface of body smoother, pruinose. Length 3.2–4 mm. Buenos Aires. | <i>pruinosa</i> Emery. |
| 3. Preorbital carina not curved mesially behind nor crossing the antennal scrobe, but continued backward to the posterior corner of the head..... | 4 |
| Preorbital carina curved inward and entering the antennal scrobe, or at any rate, not extending to the posterior corner of the head..... | 10 |
| 4. Antennal scapes not extending beyond the posterior corner of the head... | 5 |
| Antennal scapes extending beyond the posterior corners of the head..... | 7 |

5. Body covered with white scales in addition to the hooked hairs; first gastric segment depressed above, compressed on the sides, subtruncate and bigibbous behind. Length 4.5 mm. Para.....*farinosa* Emery.
Body not covered with white scales; first gastric segment not bigibbous behind6
6. Color ferruginous; gaster with feebly developed median dorsal impression and lateral ridges. Length 3-3.75 mm. Texas.....*turrifex* Wheeler.
Color brownish yellow; gaster without median dorsal impression or lateral ridges. Length 2.5-2.8 mm. Texas....*turrifex* subsp. *caroli* subsp. nov.
7. Thorax and gaster between the tubercles and ridges covered with numerous small whitish scales. Length 4 mm. Costa Rica....*squamulifera* Emery.
Thorax and gaster without whitish scales.....8
8. Posterior corner of head in profile with two spines; inferior pronotal spine acute; first gastric segment with a deep median and two somewhat shallower lateral, longitudinal impressions.....9
Posterior corner of head in profile with three spines; inferior pronotal spine obtuse; first gastric segment without deep longitudinal impressions. Length 3.8-4 mm. São Paulo.....*oetkeri* Forel.
9. Color yellowish ferruginous, with the head, venter and a median longitudinal stripe on the first gastric segment, brown. Length 4 mm. Trinidad*wrichi* Forel (typical).
Color dark brown, with slightly paler legs and scapes. Length 3.5-4 mm. Matto Grosso*wrichi* var. *fusca* Emery.
10. Preorbital carina but little deflected posteriorly into the antennal scrobe; posterior corner of head in profile with two prominent, widely separated spines; pronotum without median spines; first gastric segment with three broad and rather deep, longitudinal impressions. Color deep ferruginous, with the gaster, most of the head and portions of the thorax and legs, black. Length 3.5-4.5 mm. Jamaica, St. Vincent, Culebra I. Bahamas.
jamaicensis Ern. André.
- Preorbital carina curved mesially behind and continued some distance over the antennal scrobe; posterior corner of head in profile with a single small, simple or bifid spine and several tubercles; pronotum with a pair of median spines or bifid tubercles; first gastric segment without longitudinal impressions. Color yellowish brown or ferruginous with the infuscations restricted to spots on the head and gaster or, more rarely, on the thorax.....11
11. The three pairs of lateral spines of the pro- and mesonotum short, blunt and of similar shape, being projections rather than spines. Length 2.5-3.5 mm. Arizona.....*desertorum* Wheeler.
The three pairs of lateral spines of the pro- and mesonotum of different shapes, the first pair being decidedly longer and more pointed than the others12
12. Median prothoracic spines acute, nearly as long as the lateral pair; mesonotum with two pairs of subequal spines; petiole $1\frac{1}{2}$ times as long as broad; first gastric segment with only about fifty tubercles on its dorsal

- surface and these acute and prominent. Length 2.8–3.5 mm. Guatemala and British Honduras.....*intermedia* Forel.
- Median prothoracic spines short, blunt and usually bifid, much shorter than the lateral pair; mesonotum with two unequal pairs of spines, the anterior pair often reduced to mere tubercles; petiole less than $1\frac{1}{2}$ times as long as broad; tubercles on the dorsum of the first gastric segment (except in *saussurei*) more numerous and less prominent13
13. Larger species (3.5–5 mm.) with robust spines and prominent tubercles; mesonotum in front with two pairs of spines, the anterior small and tuberculiform14
- Smaller species (2.5–4 mm.) with more slender spines and less prominent tubercles; mesonotum in front with a single multifid blunt spine or projection15
15. Sides of head rather straight and subparallel; tubercles on gaster dense and numerous; epinotal spines stouter, directed backward; color ferruginous red; hairs on legs coarse and erect. Arizona.....*arizonensis* Wheeler.
- Sides of head convex; tubercles on gaster larger, sparser and fewer in number; epinotal spines more slender, directed upward; color yellowish brown; hairs on legs less coarse, reclinate. Mexico.....*saussurei* Forel.
15. Color brownish yellow; surface of body rather smooth, slightly shining..16
- Color ferruginous; surface of body opaque and granular.....17
16. Only the front, vertex, a median spot on the postpetiole and a median longitudinal stripe on the first gastric segment black. New Jersey.
- septentrionalis* McCook (typical).
- Dark markings on the head and gaster more extensive and in addition a dark median longitudinal band on the thorax. New Jersey.
- septentrionalis* var. *vertebrata* var. nov.
17. Surface of body not covered with gray granules or glistening particles. Texas.....*septentrionalis* subsp. *obscurior* Wheeler (typical).
- Surface of body covered with gray granules or glistening particles.....18
18. Body covered with glistening particles. Texas.
- septentrionalis obscurior* var. *crystallina* var. nov.
- Body covered with small gray granules.....19
19. Thoracic spines small and slender. Texas.
- septentrionalis obscurior* var. *irrorata* var. nov.
- Thoracic spines longer and more robust; sculpture coarser. Florida.
- septentrionalis obscurior* var. *seminole* var. nov.

In my paper on the North American fungus-growing ants I described the habits of the typical *T. obscurior* of Austin, Texas, and gave measurements and figures of its nests. Mr. Hartman has sent me all his notes on several colonies of the varieties *irrorata* and *crystallina*. Although he did not distinguish between these varieties in the field, it is probable that they do not differ appreciably in habits



Nests of *Trachymyrmex obscurior*.

either from each other or from the typical *obscurior*. The observations are, nevertheless, well worth publishing, both because they were made with care and in a new locality, and because our knowledge of the North American *Attia* is still fragmentary. I am glad, therefore, to append his notes on the general habits of the two varieties and on nine of their nests, which he studied in detail, together with a table of measurements and a plate of figures of their galleries and chambers (Plate VIII). In the figures the chambers are designated by Roman, the galleries by arabic numerals.

"*Trachymyrmex obscurior* is found in the sandy woods about Huntsville, on the divide between the Trinity and San Jacinto Rivers at an altitude of about 360 feet above sea-level. The flora of these sandy woods consists of post-oak (*Quercus minor*), black jack (*Q. Marilandica*), blue jack (*Q. brevifolia*), hickory (*Hicorea villosa*), short-leaf pine (*Pinus echinata*), loblolly pine (*P. taeda*), French mulberry (*Callicarpa americana*) and bull-nettle (*Iatropa stimulosa*). Hymenoptera (*Pompilus*, *Bembex*, *Sphex*, Mutillids, Scoliids, ants, etc.), abound in this locality. Mole burrows are common. Here also occurs another fungus-growing ant, *Atta (Mycetosoritis) hartmani* Wheeler, thus far reported only from the sandy floral and faunal island at Montopolis, below Austin, Texas. This island has affinities with the Carolinian region and these affinities are even more apparent in the Huntsville locality, owing to its having a much greater number of eastern species of plants and animals.

"I have seen *T. obscurior* only in sandy soil, and she does not burrow into the underlying clay. When the sand is shallow, the chambers of the nest will be reduced in number and increased in size (nests 1 and 2) and crowded close together by a shortening of the connecting galleries.

"May and June are the months most favorable for observing the activities of the ants. At this season all the chambers, including the uppermost one, contain flourishing, pendent fungus-gardens. The soil is moist near the surface, but later, as it dries out, the upper chambers are abandoned and the ants retreat to the lower chambers which lie in soil that is probably moist throughout the year. As late as August 29 I found an excellent fungus-garden (but not containing pupæ) at a depth of 12 inches. The shade of the trees prevents the heating of the ground to a very great depth.

"In habits *T. obscurior* scarcely differs from the other species of the subgenus. The workers are sluggish in their movements and 'play possum' or 'feign death' like their congeners. Caterpillar excrement is used for the substratum of the fungus-gardens. At the beginning of the season (May and June) work is carried on both day and night, but later the ants come forth only at night, except on cloudy days, after a rain the night before, when a few individuals may occasionally be seen outside the nest. (August 29 *e. g.*) On July 24 at 8:30 A. M. I saw a few ants at a single nest, and these all seemed to be coming in. August 5 at 9 P. M. I made the rounds of five nests and found individuals abroad at three of them. At one they were out in large numbers. The light of my lantern threw them into great excitement.

"During 1911 the marriage flight took place in June. On July 22 I found nest 8 which I believe had been excavated by a queen fecundated during this summer. Very little excavating was done after July 1.

"The surface portion of the *obscurior* nest is typically a crescentic crater, several inches high at its highest point, with the entrance corresponding to the center of a circle of which the crescent is an arc. Nest no. 4, which had a circular crater, and nest no. 3, with a simple conical crater, were exceptions, or rather variations from the type. The entrance is usually concealed under vegetable debris, as is often the case in nests of other fungus-growing ants. The number, shape and size of the chambers and the length, direction and method of branching of the galleries are very variable, as will be seen from the accompanying figures. I give herewith a table of dimensions of the chambers (length, breadth and thickness) and of the galleries (length), together with the depth of the floor of the lowermost chamber below the surface. The chambers and galleries are numbered in sequence as in Wheeler's paper, "The Fungus-growing Ants of North America." My measurements in the field were recorded in the English instead of the metric system, but in the table these measurements have been reduced to millimeters, so that they may be readily compared with those in Wheeler's table. The following notes on the individual nests are added as an aid in interpreting the figures of the plate:

"Nests 1 and 2.—(May 31.) At the foot of a sandy knoll. The

TABLE OF MEASUREMENTS (IN M.M.) OF NINE NESTS OF *Trachymyrmex obscurior* (TWO VARS.).

[illegible]

sand here was very shallow and underlain by tough, red clay. As the ants did not, so far as I observed, excavate in the clay, they contented themselves with making a few large chambers near the surface. Nest 1 was 13 cm. (5 in.), nest 2, 15 + cm. (6 in.) deep. Each chamber of these nests was filled with a flourishing fungus-garden. The number of ants in each colony seemed to be below the average.

"*Nest 3.*—(About the middle of June.) This nest was excavated in deeper sand (2 ft. to red clay) than nests 1 and 2, and was found near nest 5, the deepest of all. Perhaps I missed the lowermost chamber. The uppermost was only 13 mm. ($\frac{1}{2}$ in.) below the surface, the lowermost 20.5 cm (8 in.). Ch. I contained dried, yellow remains of a fungus garden; Ch. II and Ch. III splendid gardens, all suspended from the ceiling by rootlets left for the purpose. Both Ch. II and Ch. III were used as brood chambers, especially Ch. III which was almost choked with fungus, workers, males, winged females and young in all stages. The exact number of individuals taken was as follows: 376 workers, 92 mature males and females, 215 pupæ. There were also many larvæ, mostly large and well developed. The crater of this nest was not of the crescentic form, but was merely a conical pile of sand situated several inches to one side of the entrance.

"*Nest 4.*—(May 31.) This nest had a low crater in the form of a perfect circle around the entrance as shown in the figure. The entrance, as usual, was concealed under leaves and other débris. The workers were carrying in caterpillar excrement. Fungus-gardens were found in all the chambers.

"*Nest 5.*—(Middle of June.) This was the deepest nest found, Ch. VI being 66 cm. (26 in.) below the surface of the sand. The chambers were of the vertically flattened type except Ch. VI which was spherical (comp. nests 3, 5, 6 and 7). Ch. V had an accessory pocket on one side, probably due to the unfinished excavation of the roof of the chamber. Gal. 2*a*, could be plainly followed but Gal. 2*b* and 3 only in part. My notes state that I was tolerably certain of the courses of Gal. 3 but not of 2*b*. It would seem that the ants must have had more use for Gal. 2*b* than for Gal. 3. A fungus-garden was found in each of the chambers. The sand was very damp below.

"*Nest 6.*—(June 26.) Of this nest, which was of the compound

racemose type, I give two figures, one in a plane perpendicular to the other. It was the most singular nest examined. Ch. II had coming off from it Gals. 3, 4 and 5. The shape of the chambers was peculiar in that their long axes were oblique (Ch. III) or more or less vertical (Ch. III, V and VI). Ch. V extended down to a depth of 25.5 cm. (10 in.). Very little fungus was found and not more than fifty workers. The gardens were evidently worn out. Several winged forms appeared and a few larvæ and pupæ were taken from Ch. IV and V. It is probable that I missed a chamber somewhere below Ch. V.

"Nest 7.—(July 20.) Undoubtedly a nest of the racemose type. I could not, however, satisfy myself in regard to the relations of Ch. III and IV to the remainder of the nest. Ch. I contained a few ants but no fungus gardens. Two mother queens came up into this chamber after I had begun to excavate. The workers, too, seemed anxious to get away. Gal. 1 was 6 mm. ($\frac{1}{4}$ in.) in diameter. Ch. II and III were full of dark colored fungus-gardens. Ch. IV contained a normal garden and brood, and in Ch. V there was a little fungus piled high and full of white pupæ. The ants had done no excavating between July 8 and July 20.

"Nest 8.—(July 22.) The crater *a* of the figure was recognized as that of a *Trachymyrmex* nest and on digging under it I came upon Ch. *c* and *d*, which evidently belonged to an abandoned nest. Continuing the excavation with care, I found a small chamber 13 mm. ($\frac{1}{2}$ in.) in diameter and about 18 cm. (7 in.) below the surface. It contained a small fungus-garden, a mother queen and five or six workers. The latter were light colored and evidently young. There were also several pupæ. I believe that this must have been an incipient nest and the queen therefore young and recently fecundated.

"Nest 9.—(August 29.) Excavated on a morning after a generous rain the day before. Several ants were seen near the entrance. The soil had been moistened by the rain to a depth of 13 cm. (5 in.); lower down it looked very dry but felt slightly moist and cool, although it was not wet enough to "ball up" when squeezed in the hand. Ch. I contained a few workers and Gal. 2 was full of them and of a rather old-looking fungus-garden. Ch. II contained a flourishing garden suspended from the ceiling but was not of the bright color seen in gardens unearthed during the spring. A few pupæ and several light-colored workers were observed."

A QUIESCENT STAGE IN THE DEVELOPMENT OF
TERMES FLAVIPES KOLLAR.¹

BY E. H. STRICKLAND,

CARNEGIE SCHOLAR IN ECONOMIC ENTOMOLOGY, BOSTON, MASS.

(WITH PLATE IX.)

During the early spring of the present year Professor W. M. Wheeler, of Harvard University, very kindly gave me some specimens of an apparently undescribed stage in the development of the imagines of our common white ant, *Termes flavipes*, which he had taken the previous year from several colonies at Ellisville, Mass., just prior to the swarming period. These individuals were, he noticed, very sluggish and unable to escape, as did the normal forms, when the colony was opened up. They were also conspicuous, owing to the fact that the wings were carried at some distance from the body as shown in Figs. 4, 5, and 6.

On Professor Wheeler's advice I examined nests this spring in the neighborhood of Boston in order to see whether this was a normal condition, and with his help I have been enabled to bring together the following facts.

The colonies of white ants first began to show activity toward the latter part of March and at this time consisted of numerous workers and nymphs with a smaller number of soldiers and complementary royal forms. The nymphs were then quite normal, and the wings were folded over the dorsal portion of the body in the usual position.

The colonies were kept under observation from time to time in order that specimens of maturing nymphs might be taken as soon as the first adults began to appear. In 1910 adults were first taken on April 20 and nymphs were still plentiful in material collected on April 24. This year however everything was very late and no adults were seen until May 6 when a number of freshly emerged imagines were found in a large colony. On the following day I intended to collect a large number of nymphs from various colonies that I might

¹ Contributions from the Entomological Laboratory of the Bussey Institution, Harvard University. No. 49.

see how they underwent their final ecdysis. Unfortunately the sudden rise in temperature at this time had so accelerated the swarming period that in every colony examined the nymphs had assumed the adult form and many were already becoming pigmented. A few nymphs and forms with outstanding wings were, however, found in one or two colonies and these were taken to the laboratory. From these it was seen that development proceeds as follows:

The mature nymph becomes very sluggish and finally all movement ceases; it then falls over on its side and the head is bent down till it lies on the ventral side of the body, along which also the antennæ and legs are extended in a backward direction (Fig. 1), while the wing pads are bent downwards till they lie laterally along the sides of the body (Fig. 2). It will be at once noticed that while in this position the nymph is to all appearances a quiescent *pupa libera*. There does not appear to be an ecdysis immediately prior to this quiescent period, however, so I would hesitate to describe it as a true pupal state though it undoubtedly has the same physiological function.

This quiescent stage lasted in the few specimens observed for a period varying from four to about nine hours. The duration in time seems to be controlled to a large extent by the amount of moisture in the earth surrounding the pupa for when specimens were placed in perfectly dry earth they were unable to pass beyond this stage of development, while the greater the amount of moisture the shorter the period. During this stage the last nymphal skin splits across the head and along the dorsum, and is slowly worked downward and backward till a large portion of it hangs freely from the apex of the abdomen on the ventral side. The legs are the last part of the body to be freed from this skin, which then becomes detached as a much crumpled mass. As soon as the wings are liberated they begin to move away from the body at their base. This is apparently due to the tracheæ in the basal portion of the wing becoming inflated. The inflation, however, does not extend beyond the suture along which the wing is subsequently broken off, and the distal portion remains tightly folded as shown in Fig. 3.

The ecdysis described above is the last in the development of the imago for the insect now disclosed is the sexually complete adult; it does not, however, become active as soon as it emerges but remains for about a quarter of an hour in the same position as that

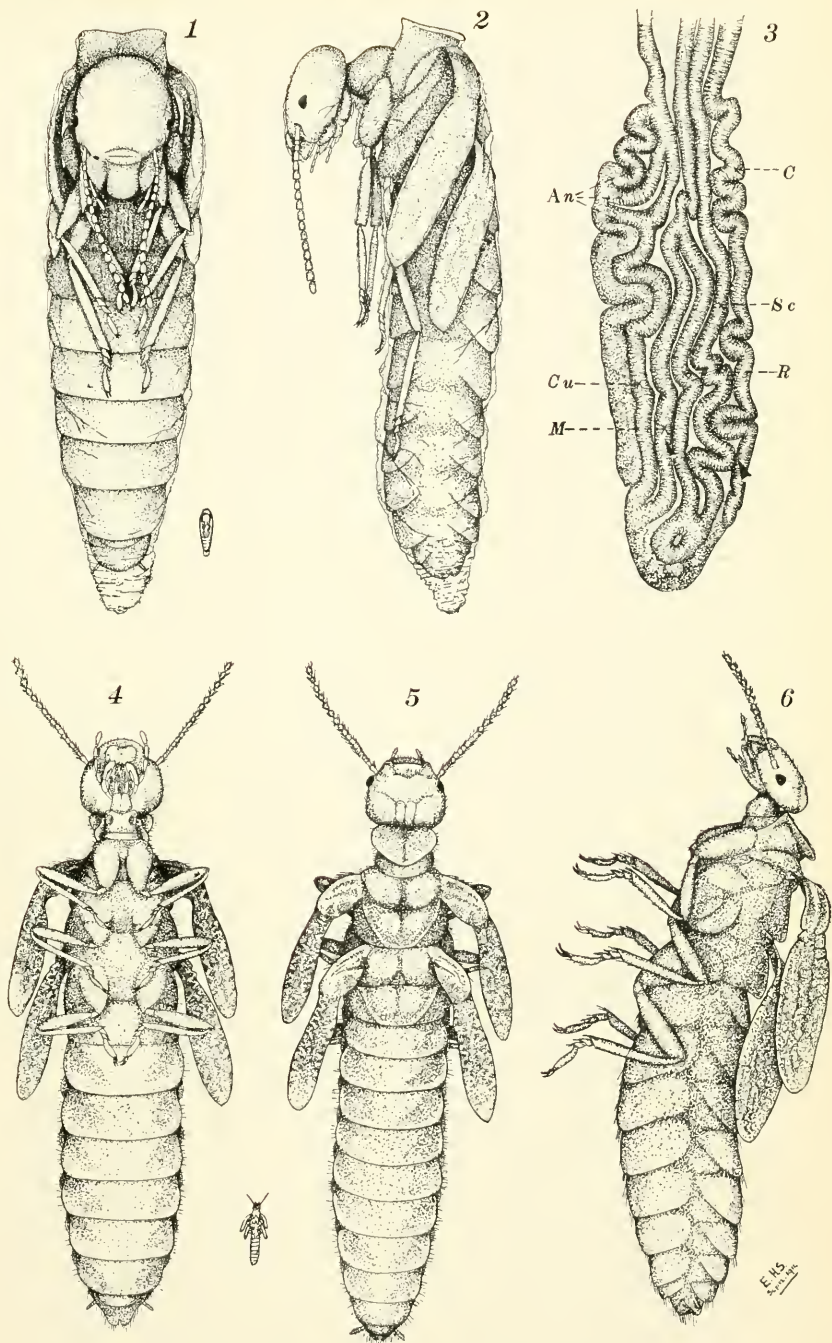
in which the ecdysis occurred. During this time, however, the head is slowly drawn upward to its normal position and the insect finally struggles to its feet. Its movements are at first very awkward and uncertain but after a few minutes it is actively running about. As before mentioned, the greater portion of the wings remains closely folded together so that at first sight they appear as abnormally placed wing-pads. A close examination with a hand lense shows them to consist of the very compactly folded wing. Fig. 3 is a somewhat diagrammatic illustration of one of the hind wings when in this condition. In it I have attempted to trace and name the various wing veins, though owing to the much folded membrane their outline was very indefinite and much less distinctly represented than in the illustration.

After these young adults have been running about for an hour or so the main portion of the wing begins to expand; the basal portion becomes fully expanded before the apical part begins to unfold, but the inflation gradually works toward the apex till the typical fully winged though pigmentless adult is produced. The wings continue to be held away from the body till this process is complete, after which they are folded from the base in an overlapping position over the abdomen. The ensuing pigmentation of the body is gradual and does not appear to be affected by the presence or absence of light; the entire body turns black through shades of yellow and brown till in about twenty-four hours the sexually complete imago is ready for swarming.

It will be seen that the whole period intervening between the normal nymphal stage and the typical pigmentless adult stage occupies only some nine to ten hours and this apparently accounts for its not having been recorded before, even though it appears to be perfectly normal, for it has occurred in different localities in two successive years and all the nymphs taken passed through these stages before completing their development.

An illustration of the thorax of *Termes flavipes* with unexpanded wings was given by Packard in his Text-book of Entomology, but he here described it as a late nymphal wing pad, otherwise there seem to be no references to either of the stages herein figured and described.

The nearest approach to the condition in *Termes flavipes* is that



Nymphs of *Termes flavipes*.



described by N. Holmgren¹ in the development of a South American termite, *Rhinotermes taurus*. In this case the worker larvæ immediately after ecdysis, pass into a quiescent condition, very similar in general appearance to the one I have described except for the fact that they have no wings, and remain in this condition for a period varying from one hour to three days. Escherich² states that this must be regarded physiologically as a pupal condition since internal changes also occur. It will be noticed that in this case the quiescent period occurs only in larvæ and then after an ecdysis, whereas in *Termes flavipes* it has only been seen to occur during the transition period between the nymphs and adults of the sexual forms and then for the greater part before the ecdysis, so that this approaches more closely to the normal pupal stage of Holometabolous insects.

EXPLANATION OF PLATE IX.

Fig. 1. Quiescent nymph of *Termes flavipes*, ventral view.

Fig. 2. Same, lateral view.

Fig. 3. Wing of adult *T. flavipes* before expansion. *c*, costal vein; *Sc*, subcostal vein; *R*, radius; *M*, median; *cu*, cubital; *An*, anals.

Fig. 4. Freshly emerged adult of *Termes flavipes*, ventral view.

Fig. 5. Same, dorsal view.

Fig. 6. Same, lateral view.

MISCELLANEOUS NOTES.

Migration of *Alabama argillacea* Hübner.—An unusual invasion of the cotton moth, *Alabama argillacea*, occurred apparently throughout the Middle States in late September and early October of the present year. According to the reports of those who have given the subject of the cotton moth careful study, the species, which is of South American or West Indian origin, feeds in the United States exclusively on the cotton plant. As cotton is grown no nearer to New York than Virginia the moths covered a distance by flight of at least four hundred miles in some instances. This seems remarkable when the condition of the specimens is taken into consideration, for in most cases

¹ Studien über südamerikanische Termiten. Zool. Jahrb. Abt. f. Syst., XXIII, 1906.

² Die Termiten oder Weissen Ameisen. Leipzig, W. Klinkhardt, 1909.

these were exceedingly fresh, and with the fore wings covering the hind wings, as the moths do when at rest, appeared as if they had just issued from pupæ. It should be mentioned, perhaps, that the species has occurred around New York in other years, but in small numbers only. The insects were first noticed around New York (New Brighton, Staten Island) on September 21, when two specimens were found clinging to a fence; other specimens were noted in the same locality in the several days immediately succeeding until on the 25th of the month seventeen were counted beneath one city light (Grossbeck). On this same day Mr. Chas. W. Leng, reported the insect from Port Richmond, S. I., where, he said, hundreds were gathered on a window attracted by lights within. Also on the same day in the evening the writer of this note noticed them in similar numbers hovering over a field of ragweed on Staten Island. Mr. G. von Krockow reported the species from several localities in New York City and Brooklyn, the principal swarm occurring in these places on September 26. He also reported them for Mr. O. Giles at Asbury Park, N. J., on September 28, where they were said to have occurred in great numbers. Mr. W. T. Davis collected a specimen at Rossville, in the southern part of Staten Island on October 1. The principal flight seemed to take place between September 26 and 28, and from then on the species occurred in ever decreasing numbers. In New York and Brooklyn the specimens seemed to be generally distributed being reported by E. Shoemaker, A. Mutchler, C. Wunder, G. W. J. Angell, J. W. Angell and G. P. Engelhardt from as many different places. Mr. Engelhardt further reported their occurrence at Yaphank, L. I., where the species came abundantly to sugar and Mr. Wunder said they were being swept up in the Pennsylvania Station at Jersey City. Away from New York and New Jersey reports came from "between Albany and Syracuse, where a specimen was seen between the double windows of a sleeping car" (Dr. H. E. Crampton); Providence, R. I., where they were said to be everywhere in the city and suburbs in swarms (E. D. Keith); New Brighton, Pa., where 241 were counted on a twelve-foot porch, 22 of which were on one window sill (Frank Merrick); Philadelphia, Pa., September 26, where they were being swept into rows on the sidewalks and gathered up (Chas. L. Pollard); and Washington, D. C., where they occurred in myriads throughout the city (Wm. T. Davis).

The latest date on which the species was noted in the vicinity of New York was October 9 (Davis; von Krockow).—JOHN A. GROSS-BECK.

The Periodical Cicada in the Half Way Hollow Hills, Long Island, N. Y.—In this JOURNAL for December, 1910, there is an article on the unexpected appearance of the periodical Cicada in considerable numbers in the Half Way Hollow Hills, Long Island, N. Y., in June of that year, and it was suggested that the clearing away of the forest in places might have had something to do with their appearance before the general visitation of Brood No. 1 in June, 1911.

In the spring and summer of 1911 careful search was made for the periodical Cicada in the Half Way Hollow Hills but none was found, not even in the areas that had been wooded for many times seventeen years. In the low land about Wyandanch Mr. Frederick M. Schott heard several singing and Mr. Charles L. Watkins saw two individuals. It was ascertained, however, that the Cicadas had occurred in great numbers in still another locality in 1910, in a place further to the north and nearer to the Dix Hills.

From the foregoing it appears that the range of Brood No. 1 (1910), which occurs in southern Pennsylvania, in Maryland, West Virginia, etc., may be extended to include the Long Island locality.—WM. T. DAVIS.

Deltometopus amœnicornis with Ants in Beech Stump.—On June 26, while collecting with Mr. E. A. Bischoff, on the brow of the hill west of the Clove Valley, Staten Island, N. Y., the stump of a beech was found which was so far decayed that parts of it could be readily pulverized by hand. This material was sifted and a few specimens of Pselaphidæ were captured as anticipated; but in addition, what had not been expected, six specimens of the Eucnemid named above were also sifted out of the rotten wood. The entire mass was populated by ants which were much more numerous than the beetles and the association of the beetles with them was probably accidental for these beetles are often beaten from the branches of the beech trees a little later in the season and three specimens were in fact captured in that way by Mr. Bischoff on the same hill in July.—C. W. LENG.

***Lasius (Acanthomyops) claviger* in Tahiti.**—Prof. C. H. Edmondson of Washburn College, Topeka, Kansas, has recently sent me, among some ants which he collected in Tahiti, a vial containing eight workers and four winged females of *Lasius (Acanthomyops) claviger*, a species hitherto known to occur only in the northern portion of the United States. Having doubts of the authenticity of the label on the specimens, I wrote Prof. Edmondson and received the following reply: "In regard to the specimens of the common ant, *Lasius claviger*, I assure you that they were also taken in Tahiti during August, 1908. I have a mental picture of the exact spot in Tahiti where I obtained them; in a broad street in the village of Papeete, under stones. I could not possibly have substituted Kansas ants, for I have never collected any ants in this state or in any other part of the United States, and there are no ants in my insect collection. Moreover, the Tahitian material was labelled in the original vial, soon after collecting." This statement leaves no doubt that *L. claviger* has been recently imported into the Society Islands and is sufficiently well established to produce queens. The only other known case of a North American ant being introduced into the islands of the Pacific is *Pogonomyrmex occidentalis* Cresson. This well-known harvester of the high plains of Wyoming, Colorado, New Mexico and the adjoining states, was recorded several years ago by Forel as occurring in Hawaii.—W. M. WHEELER.

A Desert Cockroach.—The cockroaches, so far as their habits are concerned, are commonly supposed to constitute a rather monotonous group. This is probably due to the small number and uninteresting behavior of the species that come under the observation of entomologists dwelling in temperate regions. A glance at the more recent literature, however, shows that the Blattoidea are really one of the most extraordinary groups of insects. Their immense antiquity, the diversity of their fossil forms, the probability, recently emphasized by Handlirsch, that the group produced the ancestors of the modern Termites and Hymenoptera, the gregariousness of certain species, foreshadowing the social habits of these same Termites and of many Hymenoptera, the wide dispersal of certain household species, the development of ovoviviparity in several tropical forms and of myrmecophilous and sphegophilous habits in others—all these peculiarities

show that, during their long history, the cockroaches as a group have not remained as idle and stolidly generalized as we have been inclined to believe. In connection with the description by Shelford (The Zoölogist for June, 1907) of an aquatic cockroach (*Rhicnoda natatrix*) from the pools of Borneo, the following observations on a desert species, are worth recording. On November 26, 1910, while I was standing in the hot, glaring sun in the midst of the sandy desert north of Yuma, Arizona, I saw a small swarm of about a dozen insects flying toward me. They settled one after another on the sand, ran hurriedly over its surface for a short distance in the direction of their previous flight and then suddenly took wing again. They seemed to be migrating by alternately flying and running over the sand in a southwesterly direction. A few minutes later another smaller detachment, taking the same course, passed over the same spot. On capturing one of these insects, which behaved so much like certain species of *Cicindela*, I saw, to my surprise, that it was a cockroach of about the size of our common "croton-bug" and of the same pale, grayish yellow color as the sand. I then set about collecting a number of specimens. Some of these were later identified by Mr. J. A. G. Rehn as *Homæogamia subdiaphana* Scudder subsp. *mohavensis* Rehn and Hebard. I walked about over the sandy desert for some hours but no more swarms appeared. Although these observations are very fragmentary, they prove that this Blattid in its adaptation, at least during certain seasons, to an exposed, diurnal life in dry deserts, exhibits a remarkable contrast to our northern cockroaches with their pronounced positive thigmotaxis and negative phototaxis.—W. M. WHEELER.

PROCEEDINGS OF THE NEW YORK ENTOMOLOGICAL SOCIETY.

MEETING OF TUESDAY, OCTOBER 18, 1910.

Held at the American Museum of Natural History at 8.15 P. M. In the absence of the president, Dr. E. G. Love was elected to preside. Twenty members and one visitor present.

The minutes of Tuesday, October 4, were read and approved.

The secretary read a communication from the curator, Dr. F. E. Lutz, reporting that arrangements would be made by the Museum authorities to take

care of Dr. Southwick's collection of food plants of insects and that a card catalogue would be provided to make notes concerning food relations and other interesting subjects.

Upon motion of Mr. Engelhardt, Mr. Otto Zeimet was elected an active member of the Society.

The librarian, Mr. Schaeffer, advised the purchase by the society of Blatchley's "Beetles of Indiana." Upon the motion of Mr. Wheat, Mr. Schaeffer was duly authorized to purchase and have bound a copy of this work.

Mr. Davis exhibited and spoke concerning "Some Noteworthy Hemiptera Collected on Long Island." During the past summer he had collected five species of Hemiptera which are usually more common to the south of New York and which have not been hitherto recorded from Long Island, with the exception of the fifth in the list. These were found in the Pine belt of the Island in a territory similar to that of Lakehurst, N. J. The five species mentioned were *Apiomerus crassipes*, *Lygæus bicrucis*, *Largus succinctus*, *Nezara pennsylvanica*, *Tetyra bipunctata*. He remarked concerning the stridulating organs of the latter insect. Mr. Davis also stated that he had captured a specimen of *Pamphila phyleus* in the garden of Dr. Southwick in Central Park on October 5. It was rather uncommon to find this southern skipper so far north. He mentioned that it had been taken at Lake Hopatcong, N. J., August 29, 1908.

Mr. Engelhardt mentioned that Mr. Jacob Doll had captured *Vanessa milberti* on Eastern Parkway, Brooklyn, and that another had been taken at Sheepshead Bay, Long Island.

Mr. Schaeffer exhibited a few new and interesting Coleoptera about which he had written in the JOURNAL. He also exhibited and discussed *Elateroopsis* sp., a beetle from Cuba in which the female was more brightly colored than the male, and *Conops pictus*, a fly mimicing the wasp, *Eumenes colona*. A specimen of *Pieris rapæ* impaled on the hook-like spines of burdock was also shown and commented upon.

Mr. Grossbeck under the title "Further Observations on the Life History of *Emphor bombiformis*" spoke of making various observations on the colonies of this bee to ascertain the duration of the larval and pupal life and thus complete the life history, the study of which was commenced last year and discussed before the society last winter. Specimens and drawings of the various stages of the bees were exhibited as well as a square foot of the soil showing the burrows, the cocoons of the bees, and the pollen balls.

Mr. John W. Angell reported having taken *Cicindela 12-guttata* on October 8, which he considered a late date for its capture.

Mr. Pollard called attention to a recent bulletin of the U. S. Department of Agriculture on the New Mexican range caterpillar, *Hemileuca olivia*, a Bombycine moth, which was commented upon.

Mr. Dickerson exhibited and commented upon an Hemipterous insect, *Ligyrocorus* sp., having three segments in place of four in one antenna.

Mr. Engelhardt mentioned noticing that at Promised Land, Long Island, a

moth, *Anisota senatoria*, had devoured practically all the leaves of the oak which was abundant there.

Society adjourned.

MEETING OF TUESDAY, NOVEMBER 1, 1910.

Held at the American Museum of Natural History, at 8.15 P. M., with President C. W. Leng in the chair and twenty-four members and one visitor present.

The minutes of the preceding meeting were read and approved.

The treasurer, Mr. Davis, reported that the JOURNAL account was short of funds and on motion of Mr. Joutel the treasurer was authorized to transfer the necessary funds from the Society's account.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Stett. Entomol. Zeit., LXXII, No. 1.

Deutsche Entomol. Zeitschrift, 1910, No. 5.

Jahresheft d. Vereins für Schlesische Insektenkunde, 1910, No. 3.

Anales del Museo Nacional, XI, Ser. 3.

Verhandl. d. K. K. Zool. Bot. Gesellschaft Wien, LX, Nos. 4, 5, 6.

New Moths of the Genus *Trichostibas* by August Busk.

Memorias do Inst. Oswaldo Cruz, II, No. 1.

Coleoptera of Indiana by W. S. Blatchley.

Catalogue of Odonata of North America by R. A. Muttikowsky.

The librarian requested that short notes for publication in the JOURNAL be transmitted to the secretary.

The curator, Dr. Lutz, exhibited and spoke of the Coleoptera presented to the local collection by Mr. Angell, also moths presented by Mr. Comstock.

Dr. Osburn exhibited a photograph of Dr. Zabriskie.

Mr. Sleight announced that he had been appointed to receive photographs connected with field trips of the members and exhibited several presented by Mr. Davis and Mr. Engelhardt.

Mr. Grossbeck proposed as active members of the Society, Dr. Wm. T. M. Forbes, of Rutgers College, New Brunswick, N. J., and Mr. E. E. Phillips, 201 Park Ave., Plainfield, N. J.

On motion of Mr. Angell the by-laws were suspended and the secretary instructed to cast a single ballot for the election of these members.

Mr. Groth announced the death of a former member of the Society, Dr. Otto Seifert, on October 20.

On motion of Mr. Harris, Mr. Groth was requested to write for the JOURNAL an obituary notice, including an account of Dr. Seifert's entomological work.

Dr. Southwick read a paper on the "Food of Insects." He particularly discussed the food plants of butterflies and moths, mentioning the special food of most of the United States species. He exhibited mounted specimens of a great many of the plants mentioned, which are to form part of the collection of food plants to be deposited in the Museum and used in connection with the local collection of insects.

Mr. Joutel in speaking of a new species of Cleridæ stated that he had received one specimen from Mrs. Slosson from Franconia, N. H., one specimen from Dr. Felt taken at Saranac Lake, N. Y., and another taken in Maine. In connection with these he exhibited a closely allied species from Europe, *Thanasimus rufipes*, which on closer study may prove to be identical with his species.

Dr. Love exhibited his collection of wasps of the genus *Vespa*. He commented upon the characters and distribution of the different species, mentioning the following species as occurring locally: *crabro*, *carolina*, *diabolica*, *germanica*, *maculata*, *vidua*, *vulgaris*, *consobrina* and *borealis*, the last having been collected by Mr. Davis at Newfoundland, N. J. He remarked that *Vespa communis* is a synonym of *V. vulgaris* and *V. pennsylvanica* a synonym of *V. germanica*. Photographs of the nest and comb as well as specimens were shown to illustrate the life history and development of *V. crabro*. He remarked on the peculiar color of the nest of *V. crabro* and Mr. Davis stated that the difference was due to the fact that this species prefers to use new wood fiber, especially lilac, for the construction of its lighter colored nests.

Mr. Engelhardt remarked that he and Mr. Davis had collected quite a number of the black variety of *Herodes hypophleas* on Long Island. He thought that it was usually not at all common on Long Island but had been informed that it had been taken previously near Brooklyn. He had also taken the melanic form of *Phyciodes tharos* at Yaphank, Long Island.

Mr. Pollard reported that Mr. Comstock had presented a specimen of *Carabus nemoralis* to the Staten Island Association, which had been taken in Newark, N. J., last May.

Society adjourned.

MEETING OF NOVEMBER 15, 1910.

Held at the American Museum of Natural History at 8.15 P. M., with President C. W. Leng in the chair, and twenty-two members and two visitors present.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Canad. Entomol., XLII, Nos. 10, 11.

Zeitschrift f. wissenschaftliche Insektenbiologie, VI, Nos. 8, 9, 10.

Deutsche Entomol. Zeitschrift, 1910, No. 5.

Wiener Entomol. Zeitung, XXIX, Nos. 7, 8.

Japanese Sawflies in the Coll. of the U. S. Nat. Mus. by S. A. Rower.

The Thorax of the Hymenoptera by R. E. Snodgrass.

Coleopterorum Catalogus, parts 20, 21.

Entomol. Blätter, II-VI.

Dr. Lutz announced that Major Wirt Robinson had recently visited the Museum to look at the local collection and had contributed a number of interesting specimens. He also mentioned contributions from Mr. Angell and Mr. Pollard.

Mr. Osburn and Mr. Sleight reported the receipt of a number of photographs to add to the collection.

Mr. Engelhardt presented the name of Mr. Rowland R. McElvare, 231 Decatur St., Brooklyn, as an active member. On motion, the by-laws were suspended and the secretary instructed to cast a single ballot for the election of Mr. McElvare.

Mr. Hallinan, through Mr. Davis, presented two interesting letters to add to the collection of letters of eminent entomologists, one from A. S. Packard, dated October 23, 1871, and the other from Samuel Lockburn, dated May 25, 1869.

Mr. Engelhardt related his travelling experiences in a short trip to the Adirondack Mountains in September, when he visited Ausable Chasm, Keene Valley, Cascade Lakes and Lake Placid. Among others the following insects were shown: Lepidoptera—*Catocala relictata*, *Fylina baileyi*, *petulca*, *disposita*, *unimoda*, *georgii*, *Litholomia napal*, *Lithomoia germana*, *Polia* sp., *Hyphoraia parthenos* cocoon, *Notolophus antiqua*, *Dryobota illocato*; Coleoptera—*Dytiscus harrisii*, *Hydrobius globosus*, *Cicindela repanda*, var. *12-guttata*, *Dicera prolongata*, *Adelocera brevicornis*, *Meloe angusticollis*, the last named abundant at Cascade Lakes; Orthoptera—*Pezotettix glacialis*, on hazel nut at Lake Placid; Hymenoptera—*Bombus ternarius*, *perplexus*, *fervidus*, *terricola* and an undetermined species; Diptera—*Spilomyia quadrifasciata*, *fusca* and *Conops* sp.

Mr. Olsen read an account of some experiments he had made in rearing *Cormocephala carnifex* in order to determine the life history. As the eggs were sucked dry by the young bugs, he had found it necessary to isolate these as soon as hatched.

Mr. Leng read a paper on "Variable Maculation in Coccinellidæ." He commented on the great range of maculation and tendency to variation in the members of this family and referred to some recent papers by Roswell Johnson and Major Casey in which are described a number of new species founded on slight differences of maculation and which in his opinion should not in many cases be given varietal rank as it is possible to find in a large series intergrading forms. Mr. Leng's entire paper is printed in the body of the JOURNAL.

In this connection Dr. Lutz exhibited specimens of the common asparagus beetle showing three different color variations which had been given varietal names by European Coleopterists. When interbreeding these varieties Dr. Lutz found that they held constant.

Mr. Engelhardt exhibited a number of *Cleis picta* from Claremont, N. H., to show the degree of variation in this species of Coccinellidæ. Mr. Dickerson referred to the range of variation in the Coccinellid, *Hyperaspis signata*, which feeds on the cottony cushion scale of the maple, in which certain specimens had an extra apical spot on the elytra. Mr. Davis exhibited a number of the local species of Coccinellidæ, showing variation in the typical maculation, which in some cases was due to injury in the early stages, in others the right and left elytra were unlike. Mr. Hyde exhibited some cocoons of spiders illustrating an excellent method of preparing these for exhibitions.

Mr. Schaeffer exhibited specimens of butterflies of *Papilio dardanus* subsp.

cenca, showing sexual dimorphism and variation in each of the sexes. These forms represent also *hippocoön* and *trophonius*.

Mr. Comstock stated that he had captured *Vanessa milberti* at Newark during the past summer.

It was moved and carried that work be resumed on the local collection on Saturday afternoon.

Society adjourned.

MEETING OF DECEMBER 6, 1910.

Held at the American Museum of Natural History at 8.15 P. M., with President C. W. Leng in the chair and sixteen members and one visitor present.

The treasurer, Mr. Davis, reported that the society had a balance of \$1,083.84 and the JOURNAL of \$20.59 with all costs of the current volume settled.

The curator, Dr. Lutz, reported that Mr. Sherman had prepared a list of the aquatic Coleoptera in the local collection and that he, Dr. Lutz, had prepared and had typewritten copies of useful synoptic keys for various families especially of certain aquatic groups. He asked for further contributions to these synoptic tables.

Mr. Schaeffer, for the Publication Committee, reported that all manuscript for the fourth number of the JOURNAL had been sent to the printer with the index of the current volume and it was hoped that the December number would be ready for distribution during the month.

Mr. Groth exhibited a few boxes of the collection of Arctiidae belonging to the late Otto Seifert, particularly some of the specimens with which Dr. Seifert conducted experiments with temperature effects on the early stages. Mr. Groth stated that Dr. Seifert's family had left the entire collection in his hands for disposal and he urged the importance of keeping the experimental collection of Arctiidae as well as certain other groups of Lepidoptera which had also been the subject of experiment, in the possession of the Society.

Dr. Lutz spoke of the value of this kind of work and said that the Museum, which already had type material of experimental work from Tower and others would be glad to obtain such collections.

Mr. Angell moved that Mr. Groth ascertain if the family of Dr. Seifert were willing to accept \$250.00 for the experimental part of the collection; and in that case to raise the amount by private subscription among the members of the Society and present the collection to the Museum in appreciation of what it had done for the Society.

Mr. William T. Davis stated that eleven species of Cicadidae had been found within fifty miles of New York City and exhibited specimens of all but one of them. He pointed out how they might be separated and gave some description of the song of each species and also of the distribution as far as known.

As the 17-year Cicada is due in the Hudson River valley in 1911, some attention was paid to the past history of the brood on Staten Island and

extracts were read from the Proceedings of the Staten Island Association for 1894. Between 1877 and 1894 the insect was found on the Island seven different summers, sometimes in considerable numbers as in 1881, when another brood was represented, now known as No. VI. From 1894 to 1911 the presence of the insect was noted during eight years, 1898, as was to be expected, being one of those during which they were quite numerous.

Mr. Barber, under title of "Some Results of Sifting" gave a description of a swamp near Roselle Park N. J., in which he had at various times of the year sifted rather thoroughly. He referred to its excellency as a collecting ground throughout the year but particularly recommended it as a good sifting ground. He exhibited a collection of insects recently taken in sifting there by Mr. Leng, Mr. Davis, Dr. Lutz and himself, among which were a number of good species, especially a new species, representing a new genus of Staphylinidæ. Photographs of the swamp taken by Mr. Davis were also shown.

Mr. Leng referred to a series of *Coccinella 9-notata* from Erie, Pa., taken by Mr. Hallinan and pointed out certain variations in these and compared them with a series of the same species from Fort Wingate, N. Mex.; at one extreme, in the latter series, were almost immaculate forms, corresponding with one of Casey's species; at the other extreme, were forms with the spots well developed, corresponding with the more feebly marked specimens in the series from Erie, Pa. At the other extreme of the Erie series, were many specimens with the spots enlarged and in part coalescent, illustrating the variability of the maculation in both series and the tendency to increased blackness in the more northern form.

MEETING OF DECEMBER 20, 1910.

Held at the American Museum of Natural History at 8.15 P. M. with President C. W. Leng in the chair and twenty-six members and two visitors present.

The librarian, Mr. Schaeffer, reported the receipt of the following exchanges:

Deutsche Entomol. Zeitschrift, 1910, No. 6.

Canadian Entomologist, XLII, No. 12.

Coleopterorum Catalogus, parts 22, 23.

Ten papers on Noctuidæ by Professor John B. Smith.

The curator, Dr. Lutz, reported that the local collection had received a number of Macrolepidoptera from the Staten Island Association of Arts and Sciences through the kindness of Mr. Pollard.

Dr. Osburn exhibited photographs, recently acquired by the society, of Geo. H. Horn, Henry Ulke and William T. Davis. On motion of Mr. Davis, the refreshment committee were asked to provide refreshments at the annual meeting on January 3.

Mr. Grossbeck proposed as an active member of the society, Mr. C. R. Plunkett, Flushing, L. I. Upon motion, the by-laws were suspended and the secretary was instructed to cast a single ballot for the election of Mr. Plunkett.

Mr. Pollard moved that the President appoint a committee of three to consult with a similar committee from the Brooklyn Entomological Society, in reference to a joint dinner to be given sometime later in the winter. Carried. The President appointed Messrs. Pollard, Angell and Engelhardt as such committee.

Dr. Southwick moved that a committee be appointed by the chair to nominate candidates for office, so that they could be voted upon at the annual meeting on January 3. The chair appointed Messrs. Southwick, Lutz and Sleight as a nominating committee.

The secretary presented the resignations of Dr. J. H. Stebbins, Jr., and Mr. J. R. de la Torre Bueno. Upon motion they were duly accepted.

Dr. Lutz briefly reviewed a number of recent entomological contributions to the literature of evolution, laying special emphasis upon the relation between chromosomes and sex, and the inheritance of sexually dichromatic variations.

Dr. Osburn under the title "Remarks on the Genus *Syrphus* Auctt" stated that it was a large genus containing 225 species, 64 of which occur in the United States, and 9 or 10 locally within the fifty-mile limit. He mentioned the characters used in the classification of this group and spoke of the synonymy which is in rather a tangled condition. Dr. Osburn exhibited his collection and also a specimen of *Conops* reared by Mr. Engelhardt from a *Bombus* collected at Yaphank, L. I.

Mr. Hallinan exhibited a number of Panama dragonflies. He remarked that a lizard which was common in Panama fed upon these insects, as he found out by examining the contents of its stomach. He suggested that therefore possibly the lizard indirectly helps to cause the abundance of mosquitoes.

Mr. Schaeffer exhibited specimens of different species of beetles which were captured *in coitu*, for instance: *Lycostomus femoratus* ♂ *in coitu* with *Lycostomus loripes* ♀ and *Diachus catarinus* ♂ *in coitu* with *Diachus auratus* ♀.

Mr. Charles L. Pollard, under the title "A Remarkable Dragonfly," discussed the specimen taken by him at Wilmington, N. C., August 1, 1909, which was determined by Currie as *Gomphoides ambigua*, a Mexican species not heretofore reported from the United States. Mr. Pollard stated that the insect had been submitted for examination to Professor Philip P. Calvert, who considered it to exhibit characters midway between *Gomphoides ambigua* and *G. producta*, so that it is scarcely referable to any existing species. In any case it is the northernmost record for any dragonfly of this essentially tropical genus.

Society adjourned.

H. G. BARBER,
Secretary.

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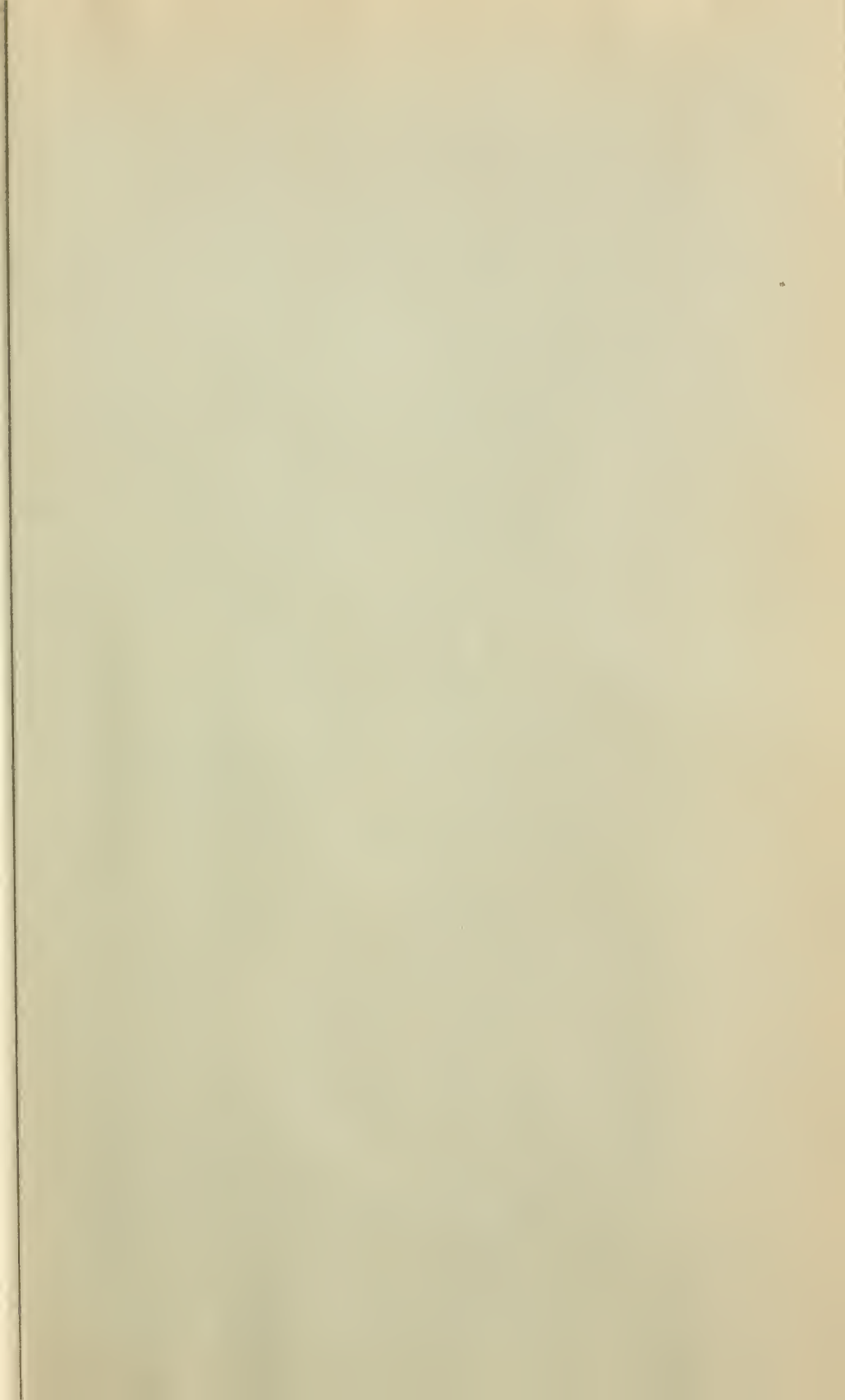
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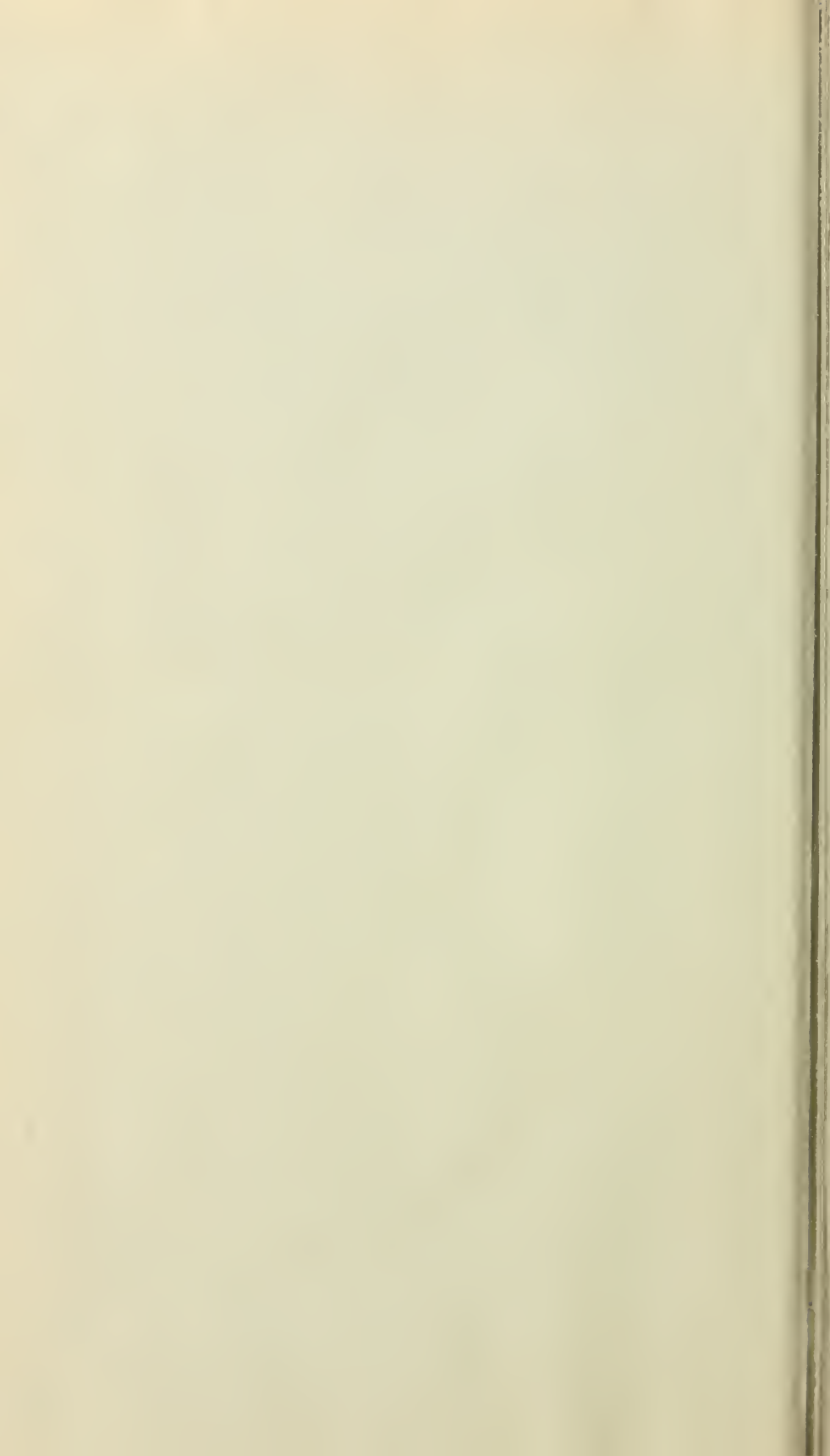
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